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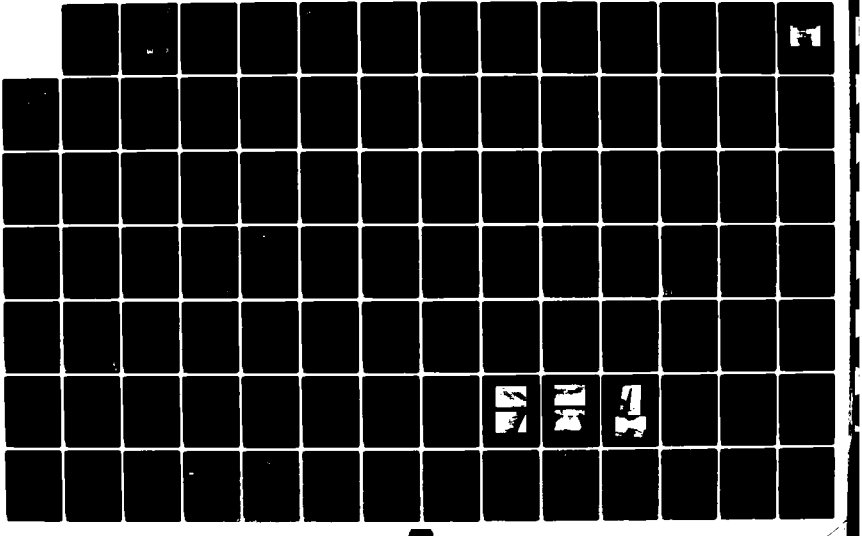

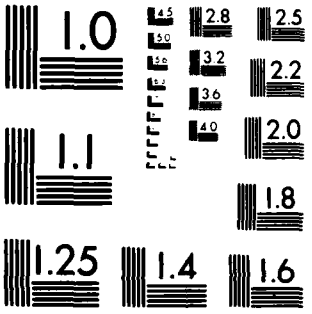

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AD-A146 194

BLACKSTONE RIVER BASIN
WORCESTER, MASSACHUSETTS

LEESVILLE POND DAM
MA 00141

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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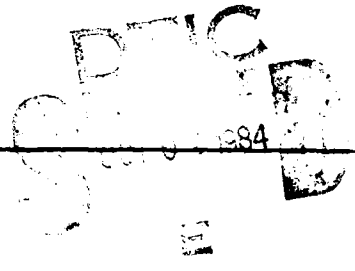

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

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Blackstone River Basin
Worcester, Massachusetts

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Leesville Pond Dam is an earthfill dam with a stone masonry spillway section. The dam is about 220 feet long, 15 feet high with an 83.6 foot long spillway. The dam is considered to be in fair condition. However, there are several visible signs of distress which may indicate a potential hazard at this site. For this reason the dam has been classified in the "significant" hazard category.

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DEPARTMENT OF THE ARMY
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REPLY TO
ATTENTION OF:

NEDED

DEC 13 1979

Honorable Michael S. Dukakis
Governor of the Commonwealth of
Massachusetts
State House
Boston, Massachusetts 02133

Dear Governor Dukakis:

I am forwarding to you a copy of the Leesville Pond Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. In addition, a copy of the report has also been furnished the owner, J.P. Realty Company, 3 Hickory Lane, Auburn, Massachusetts 01501.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Quality Engineering for your cooperation in carrying out this program.

Sincerely yours,

JOHN P. CHANDLER
Colonel, Corps of Engineers
Division Engineer

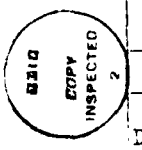
Incl
As stated

LEESVILLE POND DAM

MA 00141

BLACKSTONE RIVER BASIN
WORCESTER, MASSACHUSETTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION
PROGRAM



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NATIONAL DAM INSPECTION
PROGRAM

PHASE I INSPECTION REPORT

BRIEF ASSESSMENT

Identification No.: MA00141

Name of Dam: Leesville Pond

Town: Worcester

County and State: Worcester County, Massachusetts

Stream: Kettle Brook - Tributary of Blackstone River

Date of Inspection: July 24, 1978

Leesville Pond Dam is an earthfill dam with a stone masonry spillway section. The dam was originally constructed in about 1830 and has undergone reconstruction and numerous modifications. The dam is about 220 feet long, 15 feet high with an 83.6-foot-long spillway. The earth embankment has a wood plank core wall. The outlet controls consists of two inoperable wooden slide gates. There are no flashboards on the spillway.

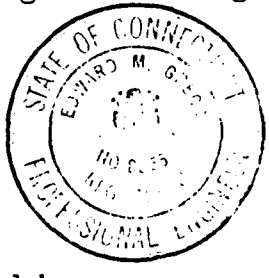
Due to its age, Leesville Pond Dam was neither designed nor constructed by current approved, state-of-the-art procedures. Based upon the visual inspection at the site and a review of the engineering data available, there are areas of concern which must be corrected to assure the continued performance of this dam. Generally, the dam is considered to be in fair condition. However, there are several visible signs of distress which may indicate a potential hazard at this site. These are as follows: seepage at the north spillway abutment, slumping and erosion on the upstream face of the dam, inoperable slide gates, leakage around the slide gates, erosion of the earthfill abutment slopes, minor spalling and cracking of the concrete in the discharge channel walls, trees and brush on the dam, and accumulation of debris in the spillway channel.

There is limited residential property immediately downstream of Leesville Pond Dam. For this reason, the dam has been classified in the "significant" hazard category, however, a failure of the dam could affect Curtis Pond Dam and in turn jeopardize the Webster Square area of Worcester.

Hydraulic analyses indicate that the existing spillway without flashboards can discharge a flow of 1,594 cubic feet per second (cfs) at Elevation (El) 488.3 which is the low area along the top of the dam. An outflow test flood of 8,600 cfs would overtop the north abutment of the spillway, which is the lowest point on the main dam, by about 5.3 feet. The remainder of the dam would be overtopped by about 3 feet. The spillway can discharge only 19 percent of the test flood and is therefore inadequate.

In the event the dam fails, a hazard does exist for the downstream inhabitants due to the effect upon Curtis Pond. Because of this potential hazard and the lack of available design and construction data, it is recommended that the Owner employ a qualified consultant to investigate the seepage and stability of the dam. In addition, the Owner should repair the slumping of the upstream face and replace the riprap. Also, it is recommended that the Owner remove the brush and trees on the dam, clear all debris from the spillway, and repair the outlet structure.

The recommendations and remedial measures described in Section 7 should be implemented by the Owner within a period of 1 year after receipt of this Phase I Inspection Report. An alternative to these recommendations would be draining the reservoir and breaching or removing the dam.



Edward M. Greco, P.E.
Project Manager
Metcalf & Eddy, Inc.

Connecticut Registration
No. 08365

Approved by:

Stephen L. Bishop, P.E.
Vice President
Metcalf & Eddy, Inc.

Massachusetts Registration
No. 19703

This Phase I Inspection Report on Leesville Pond Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

Charles G. Tiersch

CHARLES G. TIERSCH, Chairman
Chief, Foundation and Materials Branch
Engineering Division

Fred J. Ravens Jr.

FRED J. RAVENS, Jr., Member
Chief, Design Branch
Engineering Division

Saul Cooper

SAUL COOPER, Member
Chief, Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in Recommended Guidelines for Safety Inspection of Dams, for a Phase I Investigation. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detail investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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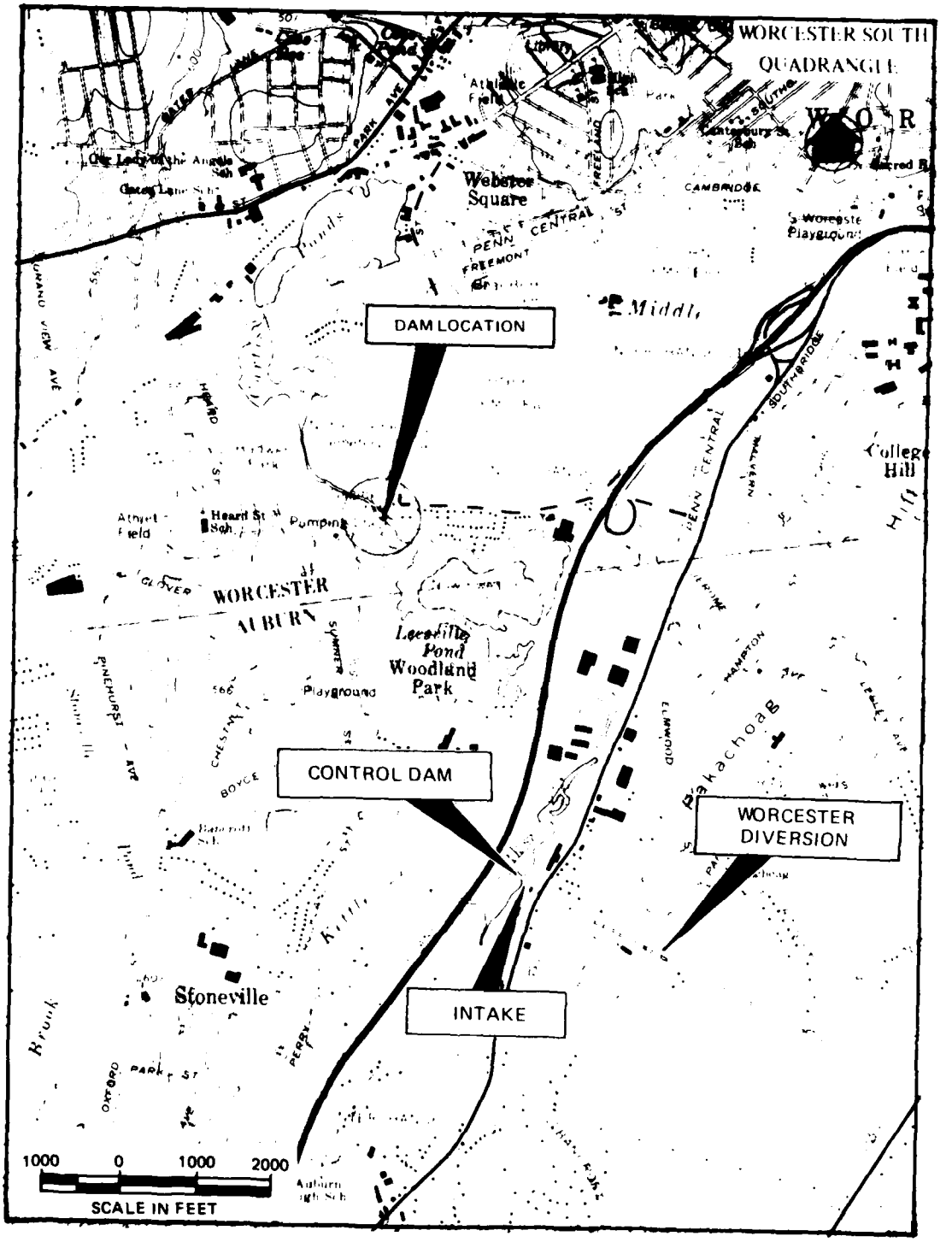
LEESVILLE POND
WORCESTER, MASSACHUSETTS

VIEW FROM OXFORD STREET BRIDGE

Location and Direction of Photographs
Shown on Figure in Appendix B



LOCATION MAP - LEESVILLE POND DAM

NATIONAL DAM INSPECTION
PROGRAM

PHASE I INSPECTION REPORT

LEESVILLE POND

SECTION 1

PROJECT INFORMATION

1.1 General

a. Authority. Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Metcalf & Eddy, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Authorization and notice to proceed was issued to Metcalf & Eddy, Inc. under a letter of May 3, 1978, from Ralph T. Garver, Colonel, Corps of Engineers. Contract No. DACW 33-78-C-0306 has been assigned by the Corps of Engineers for this work.

b. Purposes

(1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) Encourage and assist the States to initiate quickly effective dam safety programs for non-Federal dams.

(3) To update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location. The dam is located in the City of Worcester, Worcester County, Massachusetts, on Kettle Brook, a tributary of the Blackstone River. Approximately 60 percent of Leesville Pond is in the Town of Auburn. (see Location Map, and Watershed Plan, Figure D-1).

b. Description of Dam and Appurtenances. Leesville Pond Dam is an earthfill structure approximately 220-feet long and a maximum of 15 feet high (see Appendix B, Figures B-1, B-2, B-3 and B-4). The dam is comprised of a north and south earth embankment section on either side of a concrete and stone masonry spillway. The northern section, which is separated from the spillway by a gated concrete outlet channel, is approximately 60-feet long and 12-feet wide at the crest. The crest consists of a 2-feet wide and 1-foot high concrete cap wall adjacent to a 10-foot wide concrete apron. At the south embankment of the dam section the capwall is 52 feet long, and the concrete apron about 27 feet long. South of the concrete apron the crest of the dam is earth and covered with vegetation. A detailed plan of the dam is shown in Figure B-4, Appendix B.

The maximum elevation of the concrete capwall is 490.5. The concrete apron is at El 489.7. The upstream and downstream slopes of the dam vary from 1:1 to 3:1. The riprap on the south embankment has deteriorated on the upstream slope. A 2-foot-high vertical stone wall is located near the top of the downstream slope. The slopes of the north embankment are entirely overgrown by trees and vegetation.

The spillway is a flat, broad-crested weir constructed of dry-stone masonry and capped with concrete. The crest is 83.6 feet wide and at El 485. The south sidewall of the weir

is concrete, about 20 feet long and 1 foot thick. The north wall, which separates the spillway from the outlet channel, is a concrete-faced stone buttress 25 feet long and about 10-feet wide. Discharge is over the weir, down a cascade, and into a stream bed. As shown in the photograph in Appendix C, the downstream spillway section is comprised of a stepped stone section 55 feet wide, and a smooth-sloped concrete section 29 feet wide. A 4-foot diameter circular opening, possibly an abandoned outlet conduit, was noted through the sloped concrete section. The opening was probed and found to extend 17.5 feet back into the spillway. An intake to this conduit was not visible in the pond. Figure B-3 of Appendix B shows a "waste pipe" at this location.

There is a concrete intake structure located north of the spillway (see Figure B-3 for details). The flared approach channel is 11 feet wide at the gates with 1.3-feet thick concrete training walls that slope into the pond. The bed of the channel is at El 478.4. The intake structure, as shown on the 1936 drawing (Figure B-4), has two 5-foot square wooden slide gates separated by a 1-foot thick wall of concrete and covered by a concrete slab. Two rack and pinion mechanisms are on the upper slab but are not operable. The invert of the slide gates in the outlet channel is at El 476.9. The outlet channel is also 11 feet wide with concrete sidewalls and is cut in half by a 1-foot-thick sloping concrete wall that extends for 10 feet. The stone and concrete buttress on the south side of the outlet channel has a downstream slope of approximately 2:1. Access to the slide gate mechanism is by a footpath north of the crest of the dam along the shore.

c. Size Classification. Leesville Pond Dam is classified in the "small" category since it has a maximum height of 15 feet and a maximum storage capacity of 415 acre-feet.

d. Hazard Classification. Leesville Pond is approximately 2,000 feet upstream of Curtis Pond. The area between the two ponds is mostly cemetery property and parkland. In the event of failure of the dam at Leesville Pond, the effect on lives and property immediately downstream of the dam would be small. Accordingly, Leesville Pond Dam has been placed in the "significant" hazard category. However, the resulting flood wave could raise the level of Curtis Pond and could cause failure of the Curtis Pond Dam. Webster Square is immediately downstream from Curtis Pond. This is a highly urbanized area which could experience extensive property damage, and many casualties.

e. Ownership. The dam was recently acquired by the J. P. Realty Company, 3 Hickory Lane, Auburn, Massachusetts. Mr. Alex Pappas (617-832-3718) granted permission to enter the property and inspect the dam.

f. Operator. There are no known operators of the dam. The wooden slide gates appear to be inoperable due to rotted timber gate stems and missing parts on the gate mechanism.

g. Purpose of the Dam. The dam was most recently used as a storage pond for fire protection by the Worcester Rendering Company, a subsidiary of Consolidated Rendering Co., 18 Southbridge Street, Auburn, Massachusetts. Water was pumped to a water tower on the Rendering Company property where it was stored for emergency use. The Rendering Company has since closed, and the pond is now principally used for recreation.

h. Design and Construction History. A timber dam was originally built on Kettle Brook sometime prior to 1830. The dam and spillway have been entirely rebuilt since then. Beginning in 1928, construction reports by Worcester County inspectors describe the general condition and repairs needed at the dam.

Portions of the present spillway existed prior to 1928. Several modifications have been made to the dam since then. In 1928, the Worcester County Engineer's office ordered repairs, including reducing the height of the flashboards and reconstructing the timber walkway over the spillway. In addition the County recommended that concrete be placed on the south end of the stepped cascade to prevent collapse of the stonework.

The sloping concrete apron for the spillway was added sometime prior to 1931.

In 1936 plans were submitted to the Worcester County Engineer's office by Consolidated Rendering Company for the proposed installation of the waste gates (slide gates) at the north end of the spillway (see Figure B-3, Appendix B). The plan also shows the former timber crest of the weir, the flashboards, and the location of the waste pipe.

In 1937 the County noted seepage through the top of the concrete apron along the waste pipe and recommended the addition of a concrete core wall upstream of the wooden sheeting. The core wall was to extend into the south abutment and tie into the new gate structure on the north. It was recommended that the wooden weir be replaced with concrete and the waste pipe plugged. Also, the stone walls on the abutments should be raised 2 to 3 feet and an automatic tripping device installed on the flashboard pins.

The County records indicate that not all the aforementioned recommendations were implemented. Nevertheless, the dam was not severely damaged during the 1938 floods.

Alterations at the north abutment of the dam by the R. H. White Construction Company were in progress in 1954. The end product was to consist of building up the concrete walls of the sluiceway and adding a new 25-foot long

core wall constructed of 3-inch wood sheeting in a concrete footing, backfilled with an impervious clay core, and capped with concrete.

The wall was under construction when the 1955 floods overtopped the dam by about a foot and washed out both abutments. Modifications after the flood, as shown in Figure B-4, consisted of extending the core wall into each abutment to prevent future washouts. Also at this time the present concrete apron was added to the crest and extended upstream at the approach channel. New riprap was placed on the upstream slope of each abutment.

In 1958 the inspection report noted flooding in the abutting property and the flashboards were ordered lowered or removed. By 1969 the condition of the dam was rated as poor, because of leaks through the spillway, and rotting wood on the gates. A 1973 inspection report by the Massachusetts Department of Public Works (see Appendix B) calls for removal of trees and brush from the embankment and restoration of the downstream slope of the south (left) abutment.

i. Normal Operational Procedure. There are no known operating procedures at this dam. The wooden sections of the rack and pinion mechanism have rotted away, leaving the gates inoperable.

The main spillway is ungated and flows are unrestricted. The former "waste pipe" on the spillway is apparently plugged.

1.3 Pertinent Data

a. Drainage Area. Leesville Pond has a drainage area of approximately 20,540 acres (32.1 square miles), with a large number of swamps and ponds. (see Figure D-1 in Appendix D for the relative location of the pond in the watershed). Kettle Brook drains from the north and west and includes five major reservoirs for public

water supply. The brook flows through rural, sparsely developed woodland until it reaches the municipal airport and the Worcester City limits, where there is more residential development. Dark Brook drains from Dark Brook Reservoir in the south to Stoneville Pond where it joins Kettle Brook. This area is also moderately developed. A third stream, Ramshorn Brook, flows through gently rolling, very sparsely developed woodland, north to Pondville Pond and downtown Auburn, and finally to Kettle Brook.

Prior to 1959, high water in the watershed would cause flooding in downtown Worcester in the area of Webster Square. In 1959, the U. S. Army Corps of Engineers completed a major diversion structure about one mile upstream of the dam on a southern extension of the pond (see Location Map). The structure, called the Worcester Diversion, consists of an earth control dam with the crest at El 498 and a concrete ogee spillway section with the top at El 492. Major stream flows as high as to 6,000 cfs are diverted by the spillway to a tunnel and a series of canals that flow east and eventually discharge into the Blackstone River, about 3,500 feet south of the Worcester City limits. The intake of the diversion tunnel is at El 487. Two slide gates on the spillway section discharge normal flows. At the time of the inspection one gate was partly opened. During peak storm periods, however, the gates are closed and all the water is diverted to the tunnel. Detailed information on the Worcester Diversion is provided in U.S. Army Corps of Engineers, Design Memorandum No. 1, Hydrologic Analysis, August 1956.

b. Discharge at the Dam Site. Normal discharge at the dam is over the 83.6-foot-wide spillway, down the stepped and sloped sections of the cascade, and into the stream channel which is approximately 100 feet wide. The channel narrows to about 56 feet at the Webster Street

Bridge. The stream bed which is naturally lined with gravel and cobbles, is at El 475 and slopes to El 472 about 150 feet downstream. Water passes under the Webster Street Bridge through an opening which is 40 feet wide and 10 feet high from the streambed to the bottom of the lowest H beam on the bridge (see Figure B-2, Appendix B).

Downstream of the bridge is a USGS gaging station. Past this the stream flows over a small (about 3 feet high) concrete control dam built across the channel. This section of the stream channel is bounded by a stone wall on the north side and a concrete wall on the south. From there the water flows in a stream to Curtis Ponds.

Hydraulic analyses indicate that the spillway can discharge an estimated 1,594 cfs at El 488.3, which is the elevation of the north abutment of the spillway and the lowest point on the crest of the dam. An outflow test flood of 8,600 cfs (one-half the probable maximum flood minus the flow through the Worcester Diversion) will overtop the dam by a maximum of 5.3 feet. Records at the Worcester County Engineer's office state that the dam was overtopped by about 1 foot in 1955.

Controlled discharge was formerly through the slide gates. These are now closed and no longer operable.

c. Elevation (feet above Mean Sea Level [MSL]). A benchmark at El 485.0 at the spillway crest was estimated from a U.S.G.S. topographic map.

(1) Top dam: 488.3 to 490.5

(2) Test flood pool: 493.6

(3) Design surcharge (original design): Unknown

(4) Full flood control pool: Not Applicable (N/A)

(5) Recreation pool: 485.0

(6) Spillway crest (ungated): 485.0

(7) Upstream portal invert diversion tunnel (Worcester Diversion): 487.0 (upstream diversion spillway crest elevation: 492)

(8) Stream bed at centerline of dam: 475.1

(9) Maximum tailwater: 475.9

d. Reservoir

(1) Length of maximum pool: 6,800 feet

(2) Length of recreation pool: 6,800 feet

(3) Length of flood control pool: N/A

e. Storage (acre-feet)

(1) Test flood surcharge: 430 at El 493.6

(2) Top of dam: 415

(3) Flood control pool: N/A

(4) Recreation pool: 250 (Approximate)

(5) Spillway crest: 250

f. Reservoir Surface (acres)

*(1) Top dam: 50

*(2) Test flood pool: 50

(3) Flood-control pool: N/A

(4) Recreation pool: 50

(5) Spillway crest: 50

*Based on the assumption that the surface area will not significantly increase with changes in pond elevation from 485 to 488.3.

g. Dam

(1) Type: Earthfill

(2) Length: 220 feet

(3) Height: 15 feet

(4) Top width: 11 feet

(5) Side slopes: 1:1 to 3:1

(6) Zoning: Unknown

(7) Impervious core: 3-inch wood plank cutoff, backfilled with clay on upstream and downstream sides

(8) Cutoff: Unknown

(9) Grout curtain: Unknown

i. Spillway

(1) Type: Broad crest

(2) Length of weir: 83.6 feet

(3) Crest elevation: 485.0 MSL (assumed benchmark)

(4) Gates: None

(5) Upstream Channel: None

(6) Downstream Channel: Stone cascade to 50-foot wide stream bed

(7) General: Downstream bridge 150 feet from dam; 40 feet wide, 10-foot high passage for water

j. Regulating Outlets. The only regulating outlets are the two 5- by 5-foot wooden slide gates at the intake structure. The rack and pinion mechanisms for opening the gates have deteriorated beyond use, and the outlet channel, which runs parallel to the spillway cascade, is clogged with debris.

SECTION 2

ENGINEERING DATA

2.1 General. The only plans, specifications, or computations available from the Owner or State or County offices relative to the design, construction, or repair of this dam are as follows: a 1936 Plan of Waste Gate Works across Leesville Pond, and a 1955 Plan of Reconstruction of Dam on Leesville Pond which shows details of the core wall and concrete apron. Copies are included in Appendix B. Supplementary information for the hydraulic-hydrologic evaluation for the dam was provided in U. S. Army Corps of Engineers "Design Memorandum No. 1", dated August 1956, for the Worcester Diversion. Three plans for this tunnel and the control dam were provided by the Corps, but were not included in this report. The only other data available for this evaluation were visual observations during inspection, review of previous inspection reports, and conversations with the Owner and with personnel from the State and County agencies.

We acknowledge the assistance and cooperation of personnel of the Massachusetts Department of Public Works, Messrs. Willis Regan and Raymond Rochford, and of the Massachusetts Department of Environmental Quality Engineering, Division of Waterways, Messrs. John J. Hannon and Joseph Iagallo.

Also, we acknowledge the cooperation and assistance of personnel from the Worcester County Engineer's Office: Messrs. John O'Toole, Joseph Brazauskas, and Mr. Wallace Lindquist - recently retired from county service.

In addition, we thank Mr. Alex Pappas of the J.P. Realty Co., owners of the dam, who allowed us to inspect the dam and provided us with information on the history of the pond.

2.2 Construction Records. The only construction records are those listed in Section 2.1 and included in Appendix B. There are no as-built drawings for the dam.

2.3 Operation Records. No operation records are available, and there is no daily record kept of pool elevation or rainfall at the dam site. A USGS gaging station is located about 200 feet downstream from the dam, however.

2.4 Evaluation

a. Availability. There is limited engineering data available due to the age of the dam.

b. Adequacy. The lack of in-depth engineering data did not allow for a definitive review. Therefore the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance history and sound engineering judgment.

c. Validity. Comparison of available drawings with the field survey conducted during the Phase I inspection indicates that the information is valid.

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General. The Phase I Inspection of the dam at Leesville Pond was performed on July 24, 1978. A copy of the inspection check list is included in Appendix A. Periodic inspections of this dam have been made by others since 1925. A partial listing of these inspections is in Appendix B. An inspection was made in 1973 by personnel from the Massachusetts Department of Public Works and a copy of their report is included in Appendix B also.

b. Dam. Leesville Pond Dam is an earthfill dam with a wood plank core wall and a reinforced concrete capwall and apron. In general, the concrete is in good condition although there is slight spalling of the concrete at the joints in the capwall. The concrete apron and capwall tie into natural ground at the abutments. The abutment area is eroded on both the upstream and downstream slopes. On the upstream slope of the south embankment area, there is some random riprap protecting the face, however, slight slumping of the soil is visible. At the northern upstream face, a few riprap stones are visible. The upstream and downstream slopes of both embankments are overgrown with vegetation, including a number of 12- to 18-inch diameter trees on the upstream face of the south embankment.

c. Appurtenant Structures. The concrete and stonework on the spillway are in fair to good condition. Holes for flashboard pins are still visible on the weir and there is minor spalling and erosion on the training walls. The concrete face south of the stepped section is in good condition. Seepage is evident at the toe of the north spillway abutment (see Figure B-1). A tree is growing at that location and the seepage appears to be following the roots.

The cascade and downstream channel contain minor amounts of debris especially at the toe of the concrete-faced cascade section.

The outlet structure is in poor condition. The intake to the gates is submerged and there is evidence of cracking along the joints on the training walls and erosion along the water line. The slide gates are presently inoperable and it is not known when they were last used. The rack and pinion mechanisms above the gates are rusted, and the wooden parts have rotted away. There is leakage along the top of both wooden gates. In general the concrete outlet channel is in fair condition with only minor spalling, but the floor of the channel is cluttered with wood and trash. One large and several smaller trees and brush have overgrown the outlet channel.

d. Reservoir Area. The drainage area is comprised of both heavily populated urban and sparsely developed rural and wooded areas. The Worcester Diversion is located 1-1/4 miles upstream from the dam. Leesville Pond has been divided artificially by this flood control diversion, a culvert under Sword Street in Auburn, and the embankment for Highway I-290, which was added within the last 10 years.

e. Downstream Channel. The discharge from the spillway flows for about 400 feet down a gravel and cobble streambed with concrete and stone sidewalls. Below 400 feet the natural stream channel flows northwest to Curtis Ponds.

3.2 Evaluation. The above findings indicate that the dam has several signs of distress which require attention. It is evident that the dam is not adequately maintained and that deterioration will continue unless action is taken. Recommended measures to improve these conditions are included in Section 7.

SECTION 4

OPERATING PROCEDURES

4.1 Procedures. There are no operating procedures at Leesville Pond Dam.

4.2 Maintenance of Dam. Records indicate that no work has been done on the dam in almost 25 years. The dam is inadequately maintained and appears to have rapidly deteriorated in the last 10 years. The 1973 inspection report by the Massachusetts Department of Public Works (see Appendix B) calls for restoration of the eroded downstream slope at the westerly (southwest) side of the dam, and removal of brush and trees from the embankment, but makes no mention of the existing leakage around the outlet, or the faulty gate mechanism.

4.3 Maintenance of Operating Facilities. The outlet mechanism is inoperable. The slide gates are closed and cannot be opened with the existing mechanism.

4.4 Description of Any Warning Systems in Effect. There are no warning systems in effect at this dam.

4.5 Evaluation. There are no operational, maintenance, or warning systems in effect at Leesville Pond Dam. Because this dam is in the "significant" hazard category, the situation should be rectified. A program of operation and maintenance for this dam should be implemented as recommended in Section 7.

SECTION 5

HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design Data. The Probable Maximum Flood (PMF) of 31,000 cfs is based on a U. S. Army Corps of Engineers' Hydrologic Analysis: Blackstone River Flood Control, Worcester Diversion, dated August 1956. By using one-half the PMF and adjusting it for the effect of the Worcester Diversion, the inflow test flood for Leesville Pond was calculated to be 9,160 cfs. After adjusting this inflow for surcharge storage, the maximum discharge rate was established as 8,600 cfs with a water surface at El 493.6, which is 5.3 feet above the north abutment of the spillway (lowest point on the crest of the dam).

The spillway can discharge this rate with the pond at El 485.9, which is below the top of the dam. The existing spillway without flashboards can discharge a flow of 1,594 cfs at El 488.3, the elevation of the north abutment of the spillway.

b. Experience Data. Below is a summary of the highest floods recorded on Kettle Brook at Worcester (1932-1978) which was obtained from the above-referenced Corps of Engineers report and from a review of the gaging station records from 1955 to 1978:

Date	Peak discharge (cfs)
August 19, 1955	3,970
March 18, 1936	2,520
September 12, 1954	1,530
March 12, 1936	1,340
September 21, 1938	1,300
January 10, 1935	1,020

Past inspection reports state that the dam was overtopped in the 1955 flood by about 1 foot (El 491±).

c. Visual Observations. Discharge from Leesville Pond is over the main spillway and through two wooden gates located at the right abutment (see Figure B-1). The gates, however, are closed and are inoperable and therefore all discharge must be over the main spillway.

The visual inspection on July 24, 1978, found the spillway to be in fair condition. There are minor leaks between the spillway and gate structure and the concrete weir at the spillway shows signs of erosion.

An inspection of the Worcester Diversion on July 24, 1978, found that the dam, spillway, and tunnel are in excellent condition. Flow in Kettle Brook was passing through one of the slide gates. The existing water level was about 3 feet below the weir of the overflow intake.

d. Overtopping Potential. Overtopping of the dam by about 3 feet is expected under an outflow test flood of 8,600 cfs. As noted previously, however, the records on overtopping indicate that the dam was overtopped in 1955 by about 1 foot. The peak discharge for the 1955 flood was 3,970 cfs.

Presently, the Worcester Diversion will divert a significant amount of any storm flow. For example, for a maximum discharge of 6,000 cfs through the diversion plus a spillway flow of 1,594 cfs at Leesville Pond, the maximum discharge of Kettle Brook will be 7,594 cfs without overtopping Leesville Pond Dam. Because this discharge is nearly twice the maximum recorded discharge at this site, the potential for overtopping is remote.

In the event of overtopping, complete failure of the dam could occur. The resulting flood wave could cause significant loss of life and appreciable property damage if Curtis Pond Dam failed.

The outflow discharge rate under failure conditions has been calculated as about 16,000 cfs. This results in a flood wave 12 feet high 1,900 feet downstream from the dam.

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations. The evaluation of the structural stability of Leesville Pond Dam is mainly based on the visual inspection conducted on July 24, 1978. As discussed in Section 3, Visual Inspection, there were several visible signs of distress.

It is recommended that a more detailed investigation be initiated to evaluate the stability of the dam and seepage at the downstream toe of the spillway sidewall.

b. Design and Construction Data. Discussions with the Owner and County, and State personnel indicate that there are two plans but no specifications or computations relative to the design or construction of this dam. Furthermore, information on the type, shear strength, and permeability of the soil and/or rock materials of the dam embankment apparently does not exist.

The reconstruction of the Leesville Pond Dam embankment, as shown in Figure B-3, shows a proposed impervious core of wood backfilled with blue clay. This is the only data available on the materials comprising the dam embankment.

c. Operating Records. There is no evidence that instrumentation of any type was ever installed in Leesville Pond Dam. The performance of this dam under prior loading can only be inferred from previous records and physical evidence at the site.

d. Post-Construction Changes. Leesville Pond Dam has undergone at least three major stages of reconstruction as described in Section 1.2.h., Design and Construction History. There are no as-built drawings for the dam or spillway, however.

e. Seismic Stability. The dam is located in Seismic Zone No. 2 and in accordance with Phase I "Recommended Guidelines" does not warrant seismic analyses.

SECTION 7

ASSESSMENT, RECOMMENDATIONS, AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition Leesville Pond Dam has undergone several stages of reconstruction. Due to its age, the dam was neither designed nor constructed according to current approved state-of-the-art procedures. Based upon the visual inspection at the site, the lack of complete engineering data, and the lack of operational and maintenance information, there are areas of concern which must be corrected to assure the continued performance of the dam. Generally, the dam is considered to be in fair condition, although there are several signs of distress: inoperable slide gates, leakage around the slide gates, seepage at the downstream toe of the north abutment of the spillway, steep embankment slopes near the abutments of the dam, erosion of the downstream slopes on the abutments, erosion of the concrete in the training walls of the outlet intake channel, heavy growth of trees and brush on the dam embankment and downstream areas, slumping and erosion of the soil and lack of sufficient riprap on the upstream face of the dam, and wood and trash debris in the outlet channel and in the stream bed.

Hydraulic analyses indicate that the spillway can discharge a flow of 1,594 cfs at El 488.3 which is the elevation of the concrete abutment on the north end of the spillway and the lowest point on the dam crest. An outflow test flood of 8,600 cfs (half of the probable maximum flood minus the diverted flow) will overtop the main dam by about 3 feet. Previous records at this site indicate the dam was overtopped by 1 foot during the 1955 floods. With the present regulating effects of the upstream flood control structure, it is unlikely that overtopping is any longer a serious hazard.

b. Adequacy of Information. The lack of in-depth engineering data did not allow for a definitive review. Therefore the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance history and sound engineering judgment.

c. Urgency. The recommendations and remedial measures outlined below should be implemented by the Owner within one year after receipt of this Phase I Inspection Report.

d. Need for Additional Information. Additional investigations to further assess the adequacy of the dam and appurtenant structures are outlined below in Section 7.2, Recommendations.

7.2 Recommendations. In view of the concerns on the continued performance of this dam, it is recommended that the Owner employ a qualified consultant to:

a. Evaluate the stability of the dam, and

b. Evaluate the seepage at the north abutment of the spillway.

The recommendations on repairs and maintenance procedures are stated below under Section 7.3, Remedial Measures.

7.3 Remedial Measures

a. Alternatives. An alternative to the recommendations in Section 7.2 and the maintenance procedures itemized below would be draining the reservoir and breaching or removing the dam.

b. Operating and Maintenance Procedures. The dam and appurtenant structures are not adequately maintained. It is recommended that the Owner accomplish the following:

(1) repair the gate mechanism and clear the outlet channel of trash and debris

(2) repair the concrete on the approach channel

(3) cut down trees and clear brush from both embankments, the sides of the outlet channel, and the toe of the north spillway abutment

(4) repair eroded areas of the downstream face of the abutments, and replace the riprap on the upstream face of the dam

(5) fill in the waste pipe outlet with concrete

(6) clear wood and trash debris from the stream bed below the spillway cascade

(7) institute a definite plan for surveillance and a warning system during periods of unusually heavy rains and/or runoff; this should be coordinated with the operators of upstream reservoirs

(8) implement a systematic program of maintenance inspections. As a minimum, the inspection program should consist of a monthly inspection of the dam and appurtenances, supplemented by additional inspections during and after severe storms. All repairs and maintenance should be undertaken in accordance with all applicable State regulations.

(9) periodic technical inspections of this dam should be continued on a bi-annual frequency.

APPENDIX A

PERIODIC INSPECTION CHECKLIST

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PERIODIC INSPECTION

PARTY ORGANIZATION

PROJECT Leesville Pond Dam

DATE July 24, 1978

TIME 1:00 - 5:00 PM

WEATHER Sunny - 75°

W.S. ELEV. 485* U.S. ____ N.G.V.

*assumed benchmark top of spillway apron, upstream edge

PARTY:

1. Ed Greco
2. Dick Weber
3. Sue Pierce
4. Frank Sviokla
5. David Cole
6. Lyle Branagan
7. Carol Sweet
8. ____
9. ____
10. ____

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	dam	Ed Greco / Dick Weber	
2.	Spillway	Lyle Branagan	
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

PERIODIC INSPECTION CHECK LIST

PROJECT Leesville Pond dam DATE July 24, 1978

PROJECT FEATURE dam NAME Ed Greco

DISCIPLINE geotechnical NAME Dick Weber

Note: ds = downstream us = upstream

AREA EVALUATED	CONDITIONS
DAM EMBANKMENT Crest Elevation	crest is concrete w/ concrete core wall slopes ds edge for seat w/ rip rap core wall partway down ds face
Current Pool Elevation	425
Maximum Impoundment to Date	unknown
Surface Cracks	joints in concrete core wall slight spalling
Pavement Condition	none
Movement or Settlement of Crest	none visible
Lateral Movement	none visible
Vertical Alignment	+ at
Horizontal Alignment	straight
Condition at Abutment* and at Concrete Structures	concrete crest + core wall tie into natural ground
Indications of Movement of Structural Items on Slopes	none visible
Trespassing on Slopes	footpaths to north abutment
Sloughing or Erosion of Slopes or Abutments	west side: erosion on ds slope near abutment w/ rip rap tree + brush growth both sides on us + ds faces
Rock Slope Protection - Riprap Failures	south side: random rip rap us face some overgrown w/ brush north side: some random rip rap us face
Unusual Movement or Cracking at or near Toes	none visible
Unusual Embankment or Downstream Seepage	none visible
Piping or Boils	none visible
Foundation Drainage Features	none visible
Toe Drains	none visible
Instrumentation System	none visible

* 12", 18" trees on us face southembankment, brush growth ds face roots

PERIODIC INSPECTION CHECK LIST

PROJECT Leesville Pond Dam DATE July 24 [illegible]

PROJECT FEATURE spillway NAME Lyle Brown

DISCIPLINE geotechnical NAME Ed [illegible]

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	none
General Condition	none
Loose Rock Overhanging Channel	none
Trees Overhanging Channel	none
Floor of Approach Channel	none
b. Weir and Training Walls	concrete training walls, sloped concrete [illegible] support holes for flashboard [illegible]
General Condition of Concrete	minor spalling & erosion [illegible] concrete weir,
Rust or Staining	none visible
Spalling	none visible
Any Visible Reinforcing	none visible
Any Seepage or Efflorescence	none visible
Drain Holes	none visible
c. Discharge Channel *	cascade stone spillway
General Condition	fair
Loose Rock Overhanging Channel	none
Trees Overhanging Channel	[illegible] of roots & trees - debris from stonework at rocks
Floor of Channel	stone steps - [illegible] natural stream bed
Other Obstructions	

* southside of spillway is 29ft across, sloped face, with circular 4 ft drain for opening, crest is 17 ft under spillway crest

PERIODIC INSPECTION CHECK LIST

PROJECT Leesville Pond Dam DATE July 24, 1978

PROJECT FEATURE approach to slide gates NAME Ed Greco

DISCIPLINE geotechnical NAME Dick Weber

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	concrete sidewalls
a. Approach Channel	
Slope Conditions	not visible
Bottom Conditions	not visible
Rock Slides or Falls	none
Log Boom	none
Debris	none
Condition of Concrete ~~Lining~~	cracking along joints and erosion along water line
Drains or Weep Holes	none visible
b. Intake Structure	
Condition of Concrete	see slide gates A-5
Stop Logs and Slots	

PERIODIC INSPECTION CHECK LIST

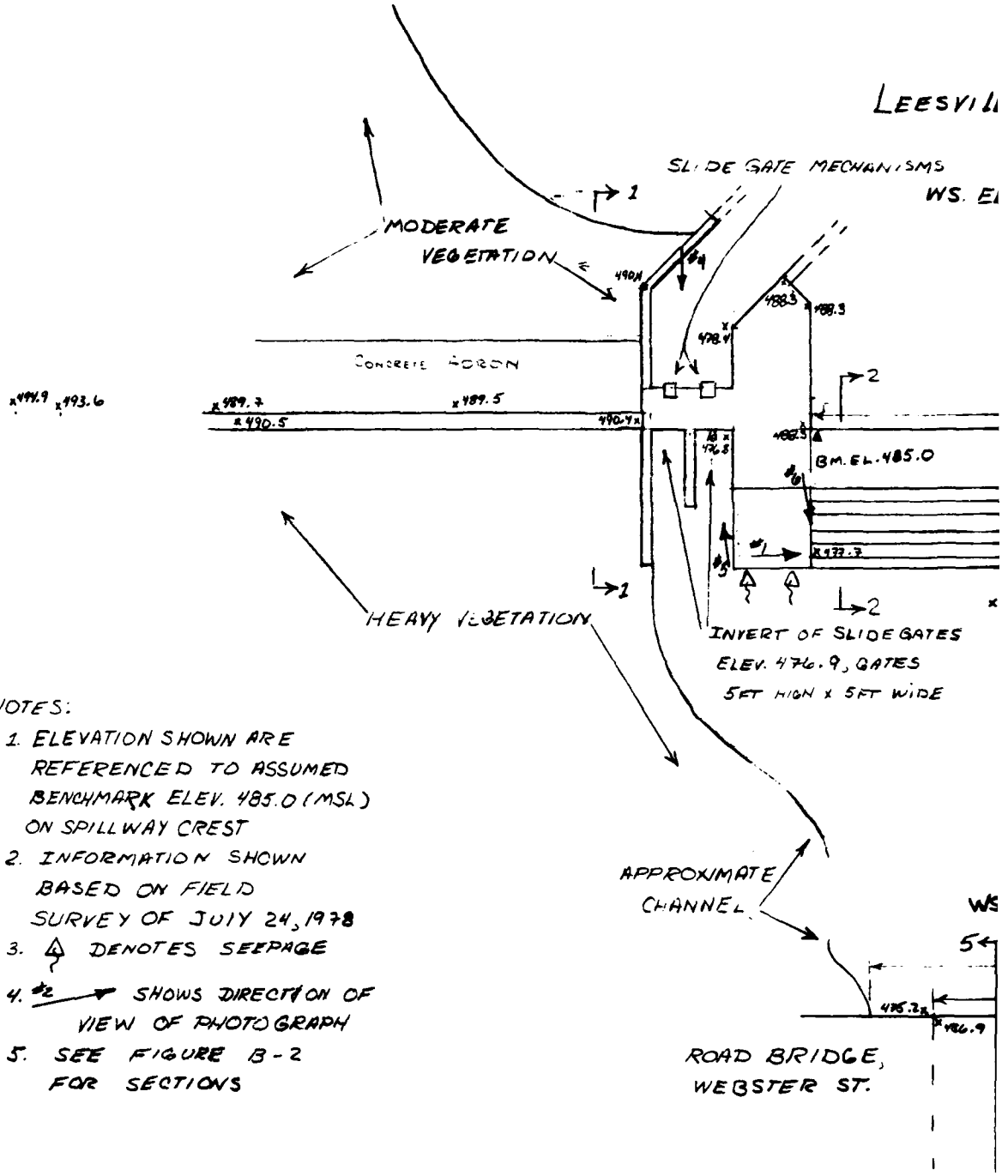
PROJECT Leesville Pond Dam DATE July 27, 1978

PROJECT FEATURE slide gates NAME Ed Greco

DISCIPLINE geotechnical NAME Dick Weiber

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE + AND OUTLET CHANNEL	2 wooden slide [illegible] concrete sidewalls + overhead slab w/rack + pinon mechanisms
General Condition of Concrete	[illegible] - minor spalling [illegible]
Rust or Staining	none
Spalling	minor local spalling
Erosion or Cavitation	[illegible] erosion of [illegible] along water line
Visible Reinforcing	none
Any Seepage or Efflorescence	[illegible]
Condition at Joints	minor spalling
Drain Holes	none visible
Channel	[illegible] bottom + sidewalls
Loose Rock or Trees Overhanging Channel	1 large + several small [illegible] growth over channel
Condition of Discharge Channel	scattered wood + trash debris

APPENDIX B



NOTES:

1. ELEVATION SHOWN ARE REFERENCED TO ASSUMED BENCHMARK ELEV. 485.0 (MSL) ON SPILLWAY CREST
2. INFORMATION SHOWN BASED ON FIELD SURVEY OF JULY 24, 1978
3. ⚠ DENOTES SEEPAGE
4. #2 → SHOWS DIRECTION OF VIEW OF PHOTOGRAPH
5. SEE FIGURE B-2 FOR SECTIONS

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LEESVILLE POND

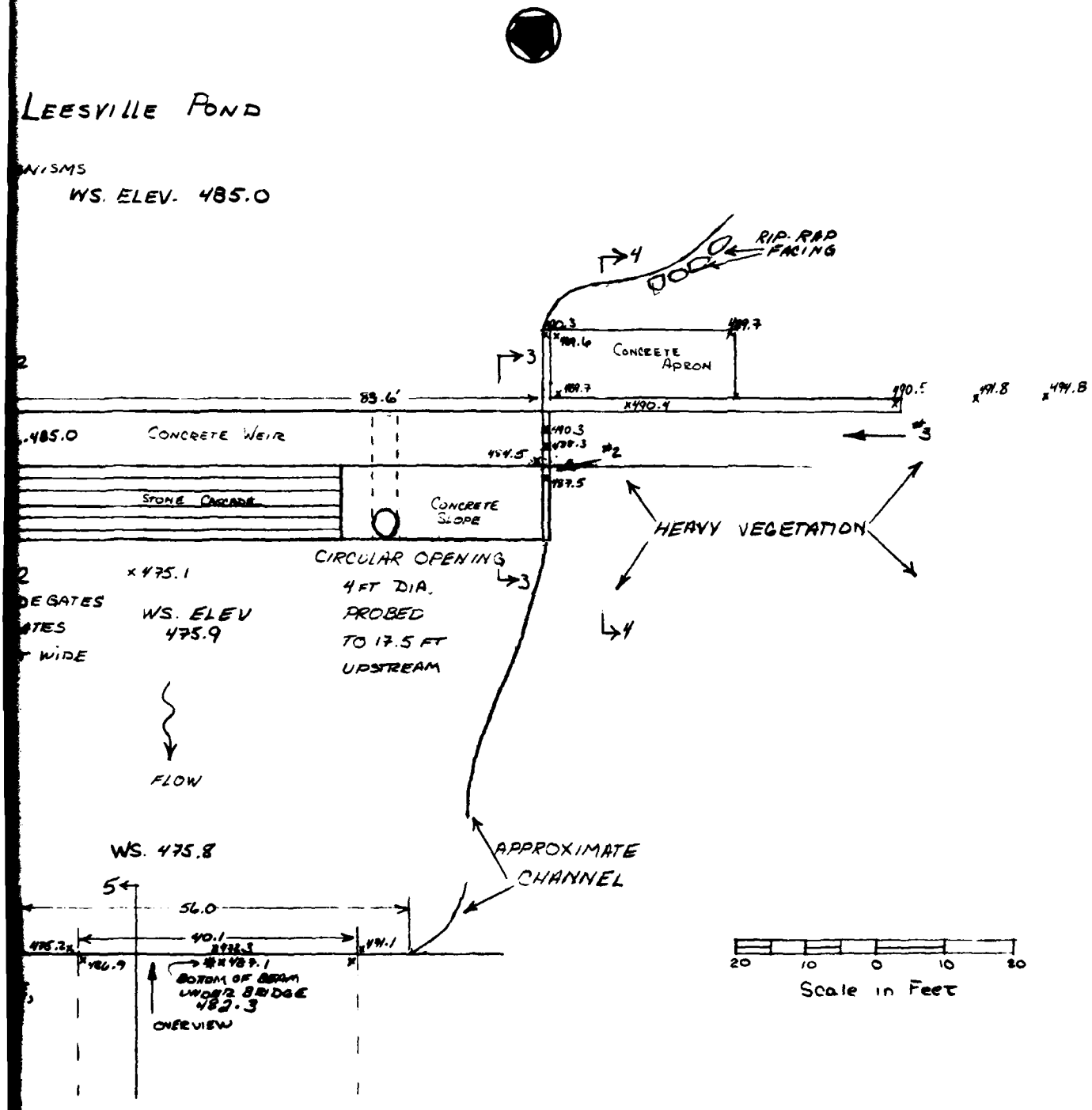
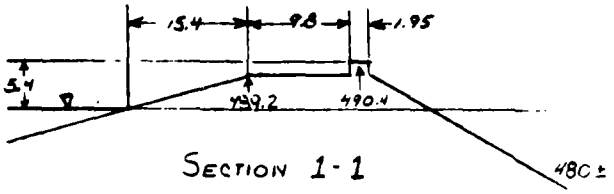
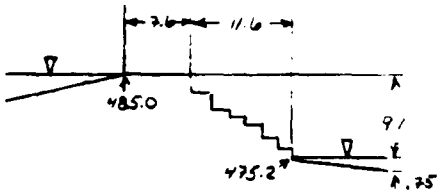


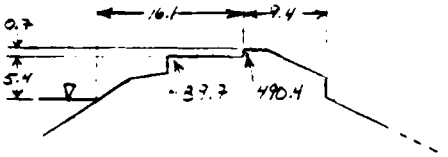
FIGURE B-1 PLAN OF DAM



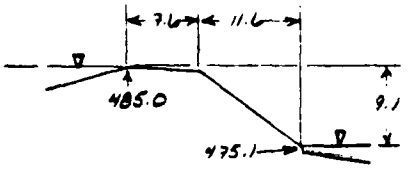
SECTION 1-1



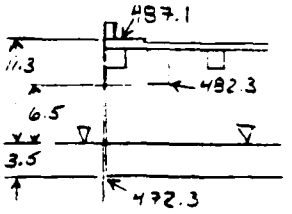
SECTION 2-2



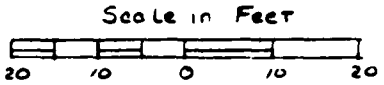
SECTION 4-4



SECTION 3-3

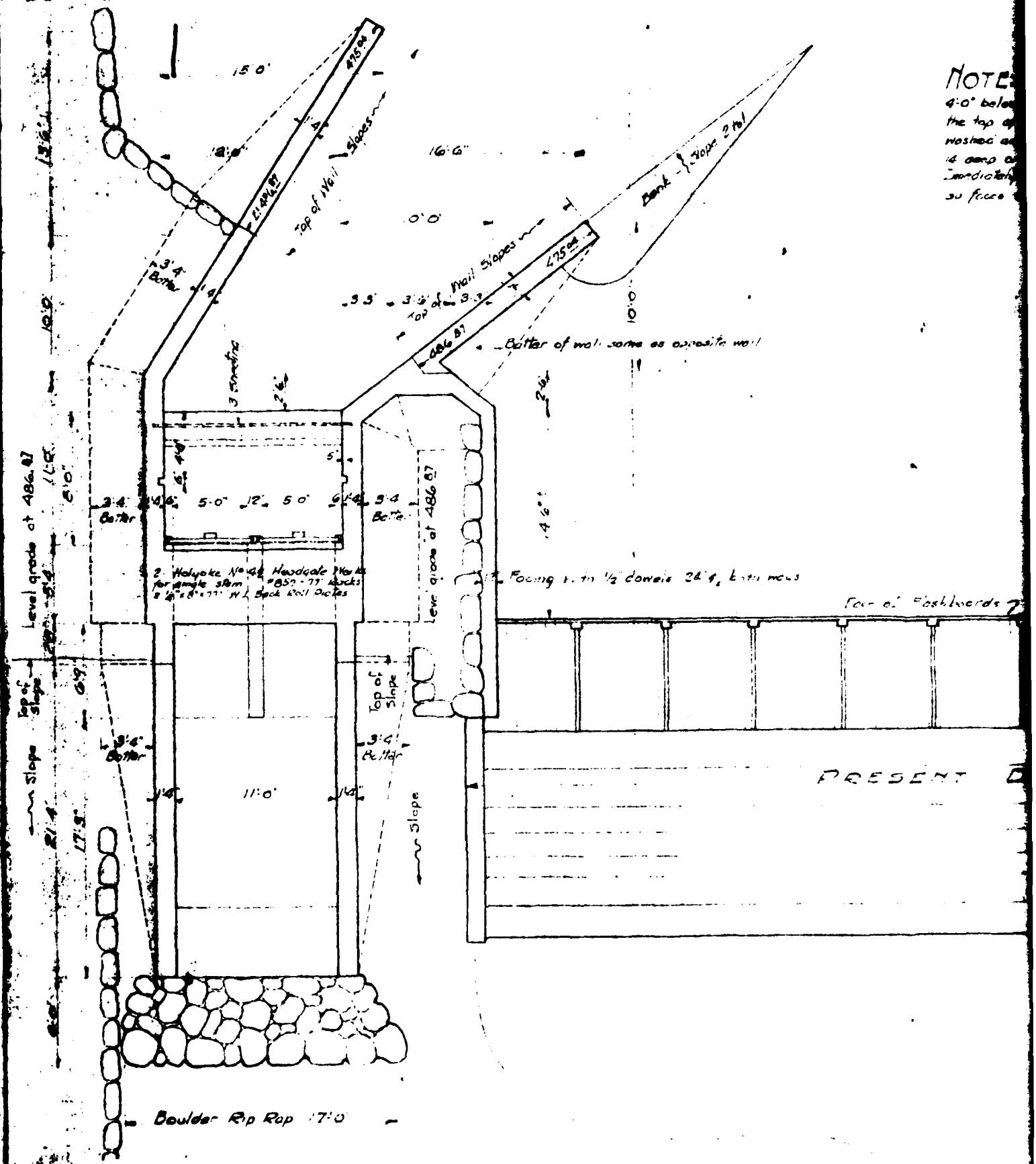


SECTION 5-5



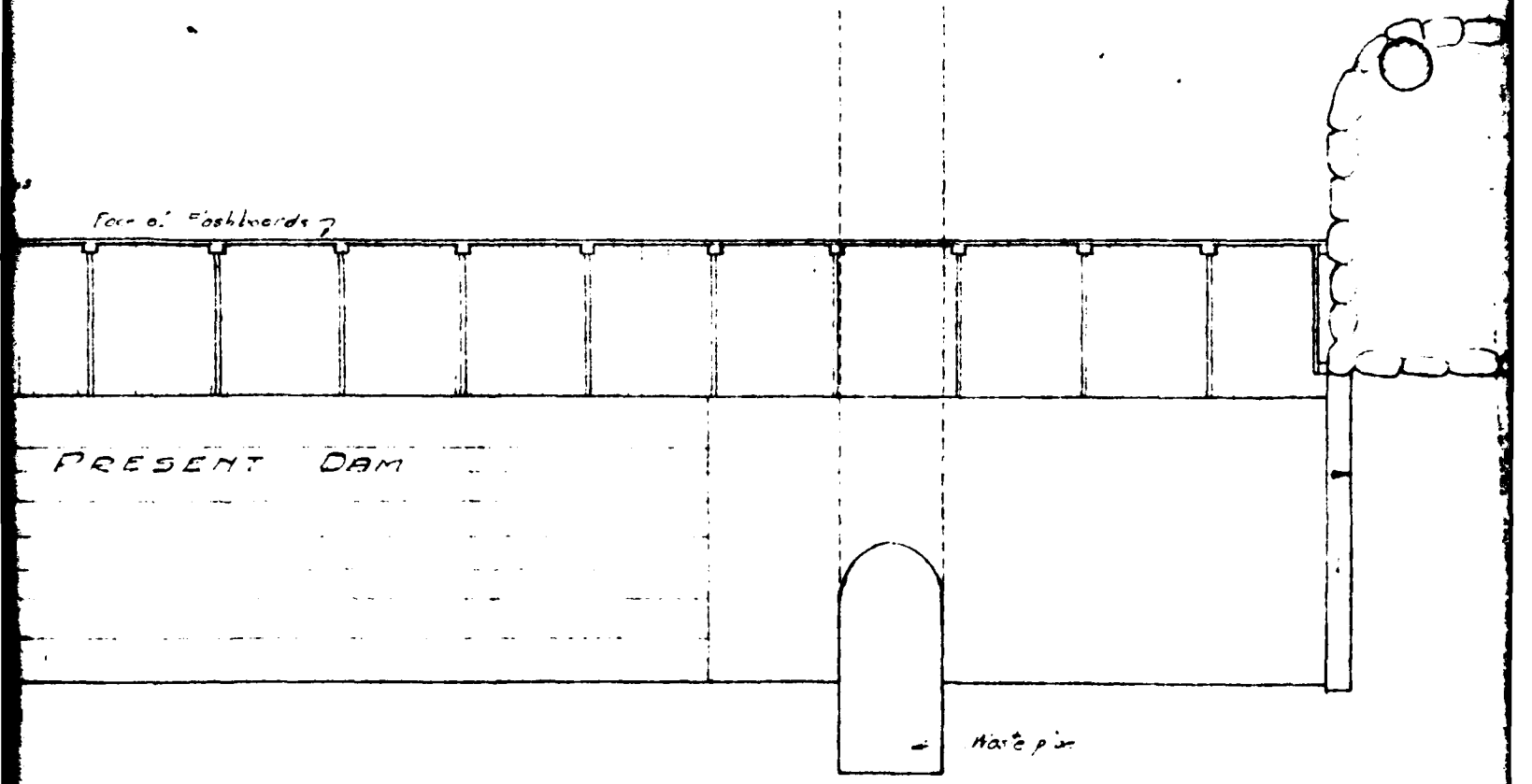
METCALF & EDDY, INC

FIGURE B-2 SECTIONS


15'0"
16'6"
Top of Wall Slopes
Bank Slope 2 to 1
Top of Wall Slopes
Batter of wall same as opposite wall
3'4" Batter
3'4" Batter
3'4" Batter
3'4" Batter
5'0"
12'
5'0"
11'0"
Level grade at 486.87
Level grade at 486.87
Top of Slope
Top of Slope
Slope
Slope
Face of Toeboards
PRESENT
Boulder Rip Rap 17'0"
NOTE:
PLAN
SCALE 1" = 8'0"

2

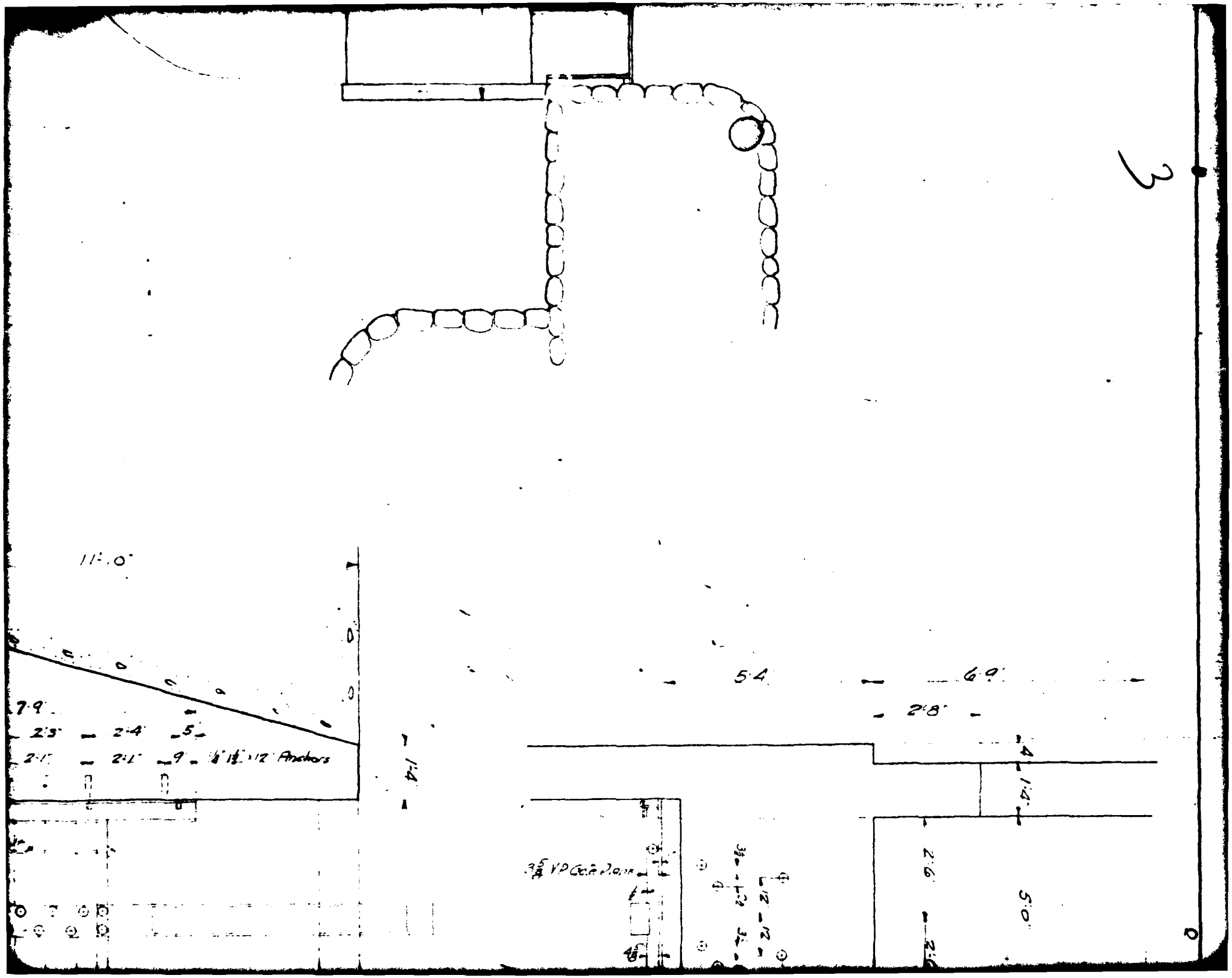
NOTE:- New concrete facing of present stone buttress shall extend at east 4'0" below the earth grade at the outside face of the buttress. If these levels expose the top of dam crest or the top of upstream dam facing the surfaces shall be thoroughly washed and cleaned and ½" dowels 2'0 long and 24" c/c will be set in newly drilled holes 12 deep or in cleaned out joints to an equal depth and the holes or joints grouted with 1:1 mix. Immediately after cleaning the exposed surfaces the Engineer shall be notified and these surfaces examined by him for possible change in these specifications

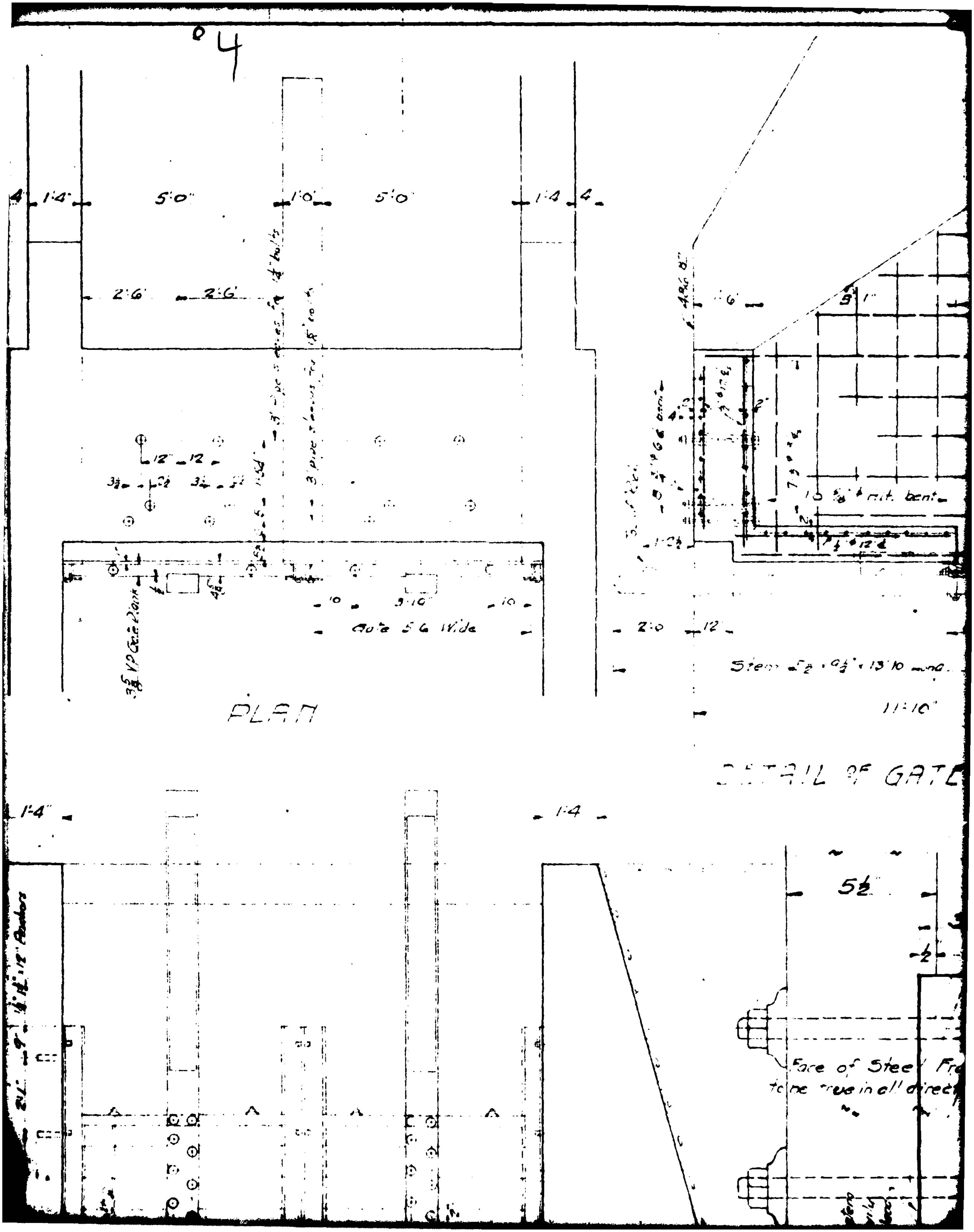


Excavate out channel about 12'0 Wide to lower waste level of pool below dam

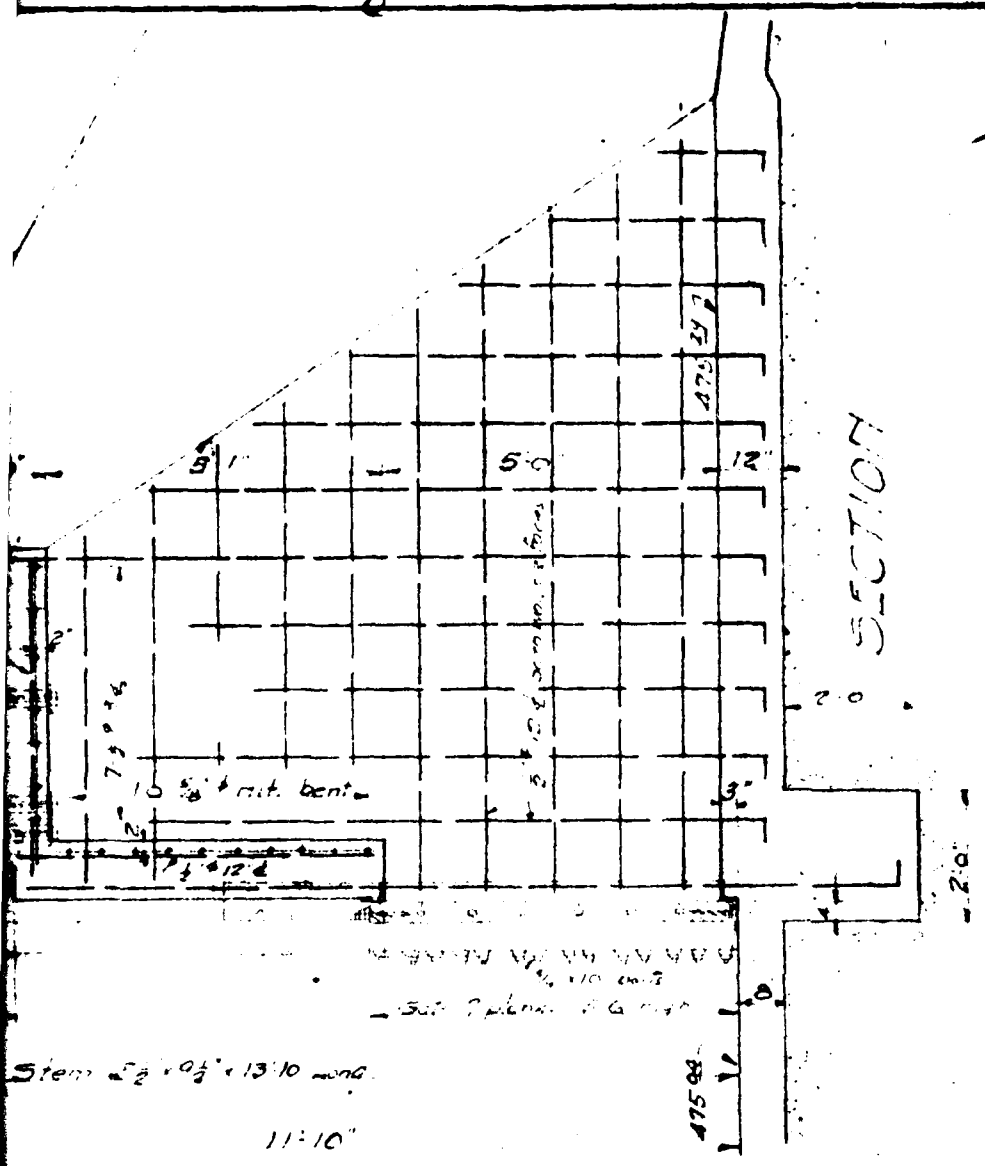
- 6'0" - 6'0 -

Bottom of channel 6' below waste pipe


3
11'-0"
7'-9"
2'-3"
2'-4"
5"
2'-1"
2'-1"
9"
1'-4"
5'-4"
6'-9"
2'-8"
1'-4"
2'-6"
5'-0"

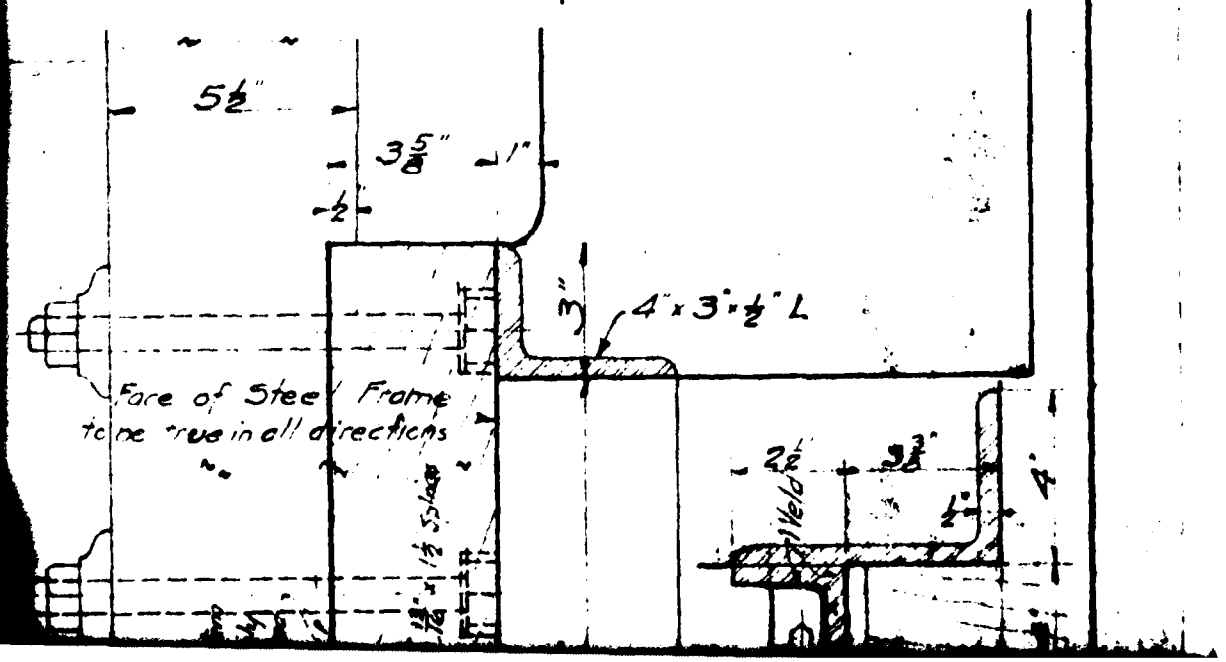

4
1'-4"
5'-0"
1'-0"
5'-0"
1'-4
4
2'-6"
2'-6"
12"
12
10
3'-10"
10
Gate 5'6 Wide
PLAN
2'-0
12"
11'-10"
DETAIL OF GAT
1'-4"
1'-4
5½"
Face of Steel Fr
to be true in all direc

5

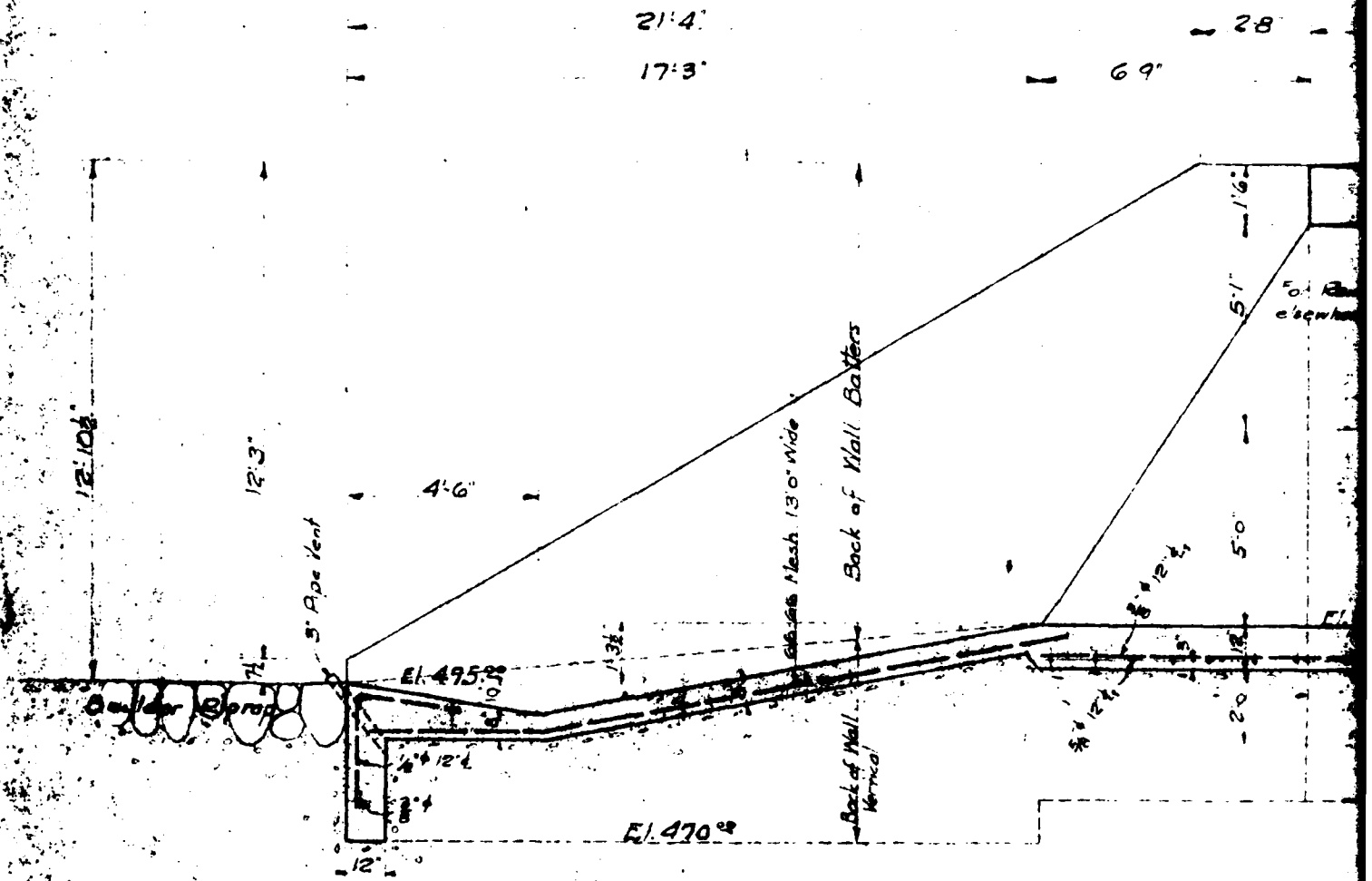


DETAIL OF GATE STRUCTURE

SCALE 3/8" = 1'-0"

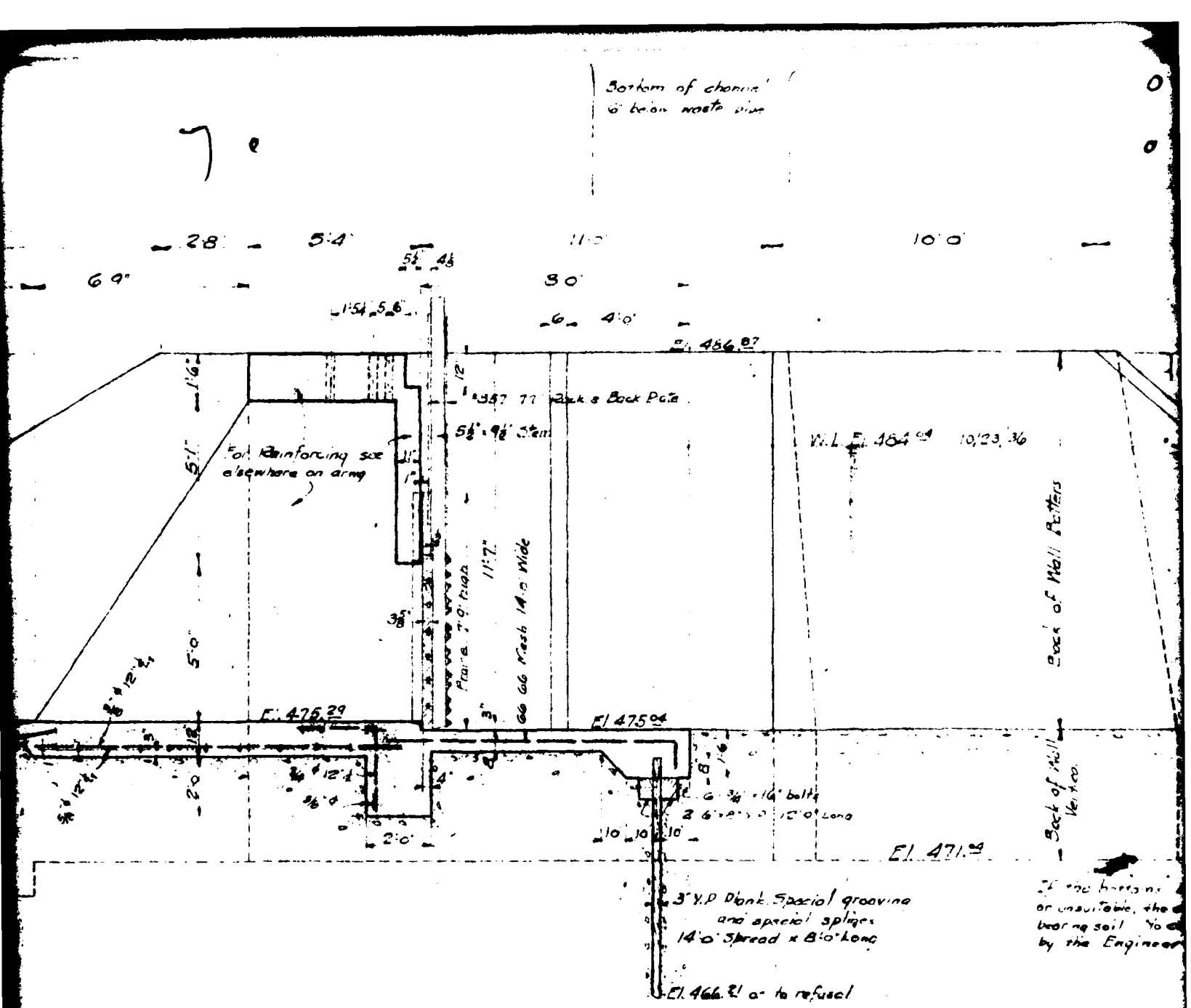


6



SECTIO

All concrete reinforced with
All concrete plain to be 1600
Top surfaces of walls and gate pl
Top surfaces of waterway slabs
All other exposed surfaces to be
All concrete shall be thoroughly
or rough unsatisfactory face



SECTION

SCALE 1" = 4'-0"

Concrete reinforced with rods or mesh to be 2200# Ultimate /in² Nominal 1:2:4 mix)

Concrete plain to be 1600# Ultimate /in² (Nominal 1:2½:5)

Surfaces of walls and gate platform to be steel troweled to a smooth even surfaces.

Surfaces of waterway slabs to be wood floated to true & even surfaces.

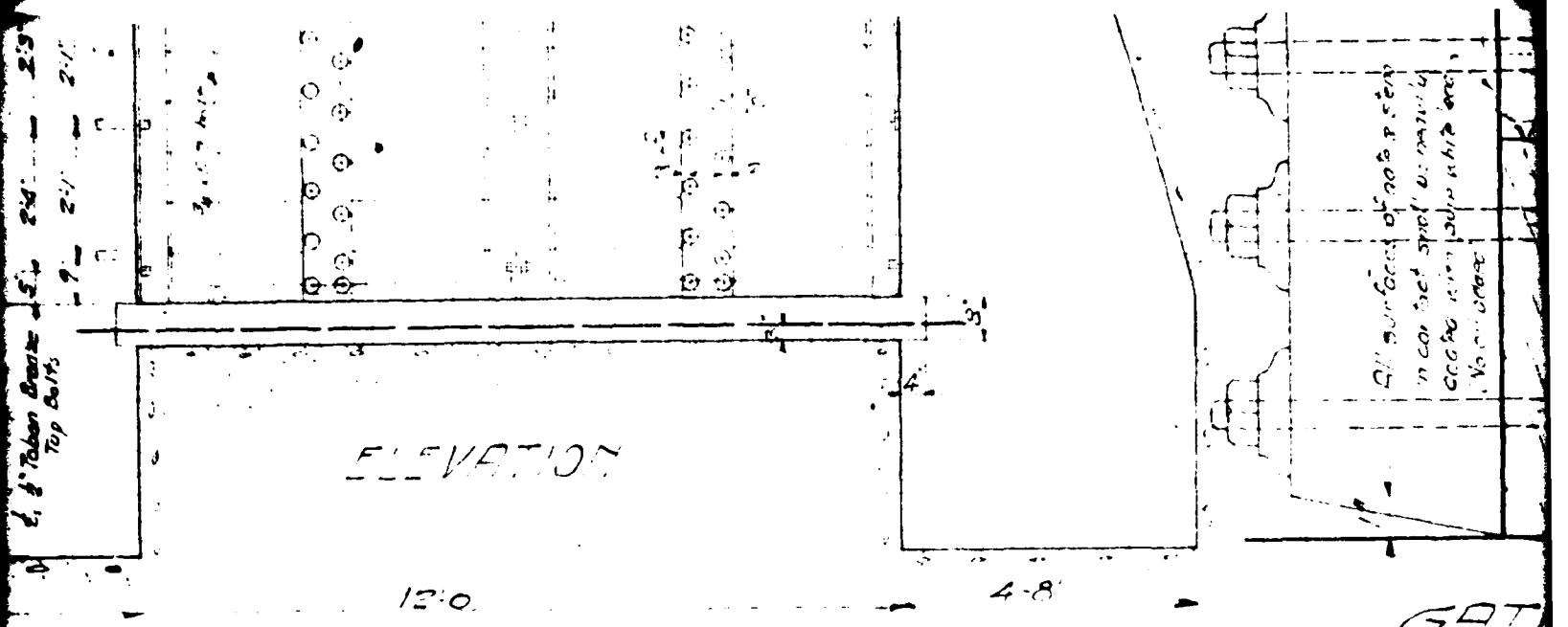
Other exposed surfaces to be rubbed with carborundum brick without the use of cement wash.

Concrete shall be thoroughly tamped and spaded to a dense concrete without voids. Pockets or rough unsatisfactory face surfaces shall be cut out and filled as directed

# Wire	Size	Length
4	14	22'
8	12	21'
12	8'10"	18'
4	3/4	67'
38	3/4	10'

BOLT LIST

#Wtd	Size	Length	Thread	Remarks	Location
4	1¼	27½"	2½"	Sq. Hd & Nut, 4"x4"x¼" washers	Hoist
8	1¼	21½"	2½"	do do	do
12	3"I.D.	18"	"	Sleeves Black Iron Pipe	do
4	¾	67"	2"	Sq Hds. Nut, Cut & G.I. Washers	Gate
32	¾	10"	2"	do do	do



For Consolidated Rendering Co.
178 Atlantic Ave, Boston, Mass.

DRAINAGE
POND AREA

REINFORCING STEEL LIST

Size	No.	Length	Mark	Shape	Location
½"	1	5'-3"	A1		Gate wall
¾"	11	5'-0"	G1		do
⅝"	10	4'-6"			do
½"	2		A2		do
	3	3'-6"	A3		do
	2	4'-11"	A4		do
	2	6'-4"	A5		do
	2	7'-10"	A6		do
	2	9'-3"	A7		do
	10	10'-4"	A8		do
	2	8'-3"	A9		do
	2	7'-3"			do
	2	6'-3"			do
	2	7'-4"			do
	2	8'-5"			do
	2	9'-8"			do
	2	9'-4"			do
	2	10'-0"			do
	2	10'-8"			do
	2	11'-4"			do
⅝"	5	14'-0"			Gate wall
½"	10	10'-0"	S1		do
	1	5'-3"			do
⅝"	16	13'-0"	G2		Gate slab - Top
½"	11	4'-0"			do Bottom
½"	11	5'-0"			do
½"	7	13'-3"			do
½"	60	1'-6"			Dowels - Buttress Footing
Lab bars	Mesh	18'-0"	x 13'-0"		Down stream apron
ab bars		10'-0"	x 18'-0"		Up stream apron

WORCESTE
WORCESTER C
WAS
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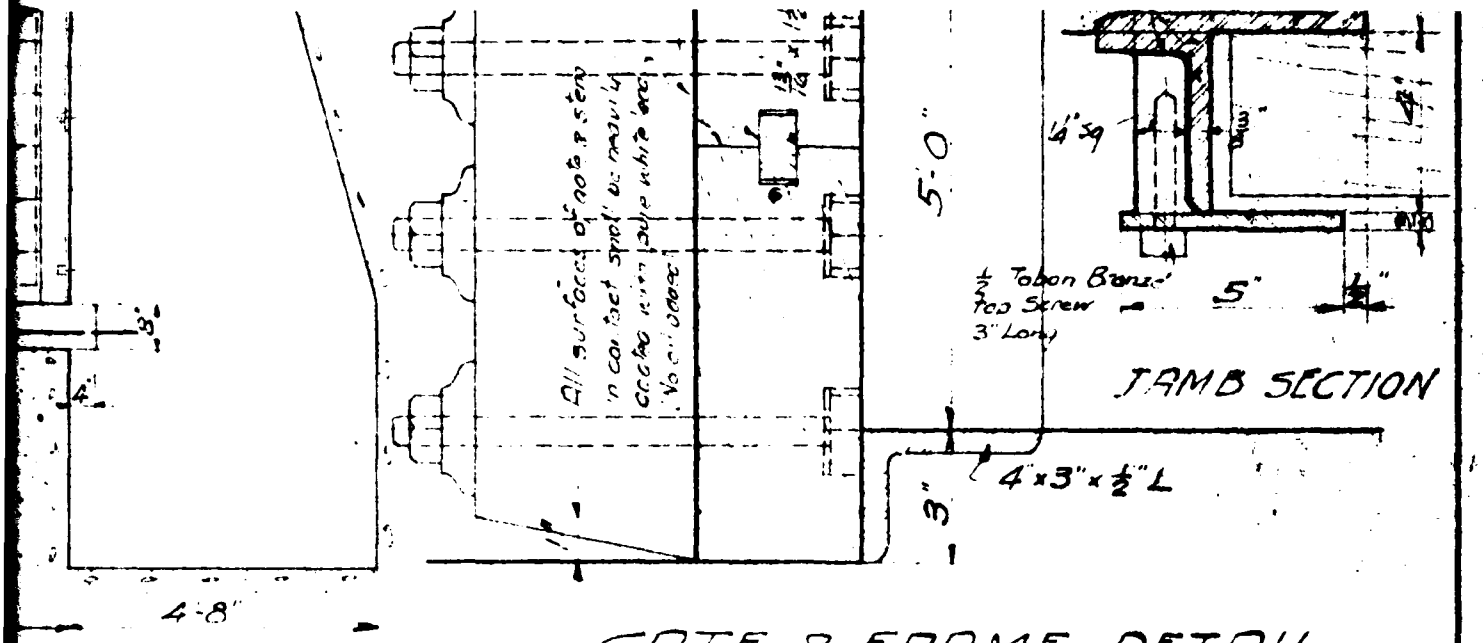
· WO
FOR · CONS
AS FILED
COUNTY

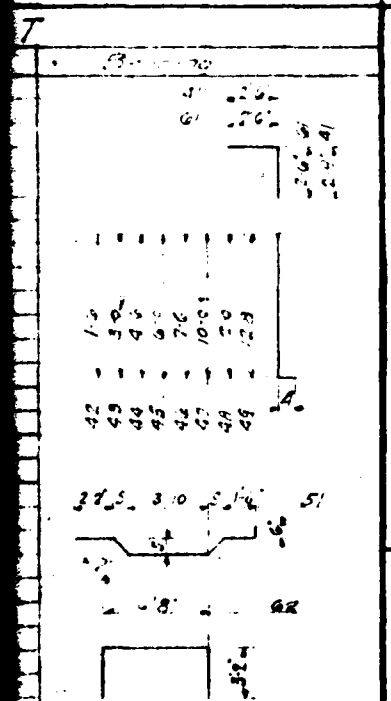
Approved: 1.2
Elbert M
Chairman, Board of Cou
George W Jon
County Com
County Com



GATE & FRAME DETAIL

SCALE 3"=1'-0"

DRAINAGE AREA 3½ SQ MILES
POND AREA 161 ACRES



WORCESTER COUNTY COMMISSIONERS
WORCESTER COUNTY ENGINEERING DEPARTMENT
PLAN OF
WASTE GATE WORKS
ACROSS LEESVILLE POND
WORCESTER, MASS.
FOR CONSOLIDATED RENDERING CO.
AS FILED AND APPROVED BY THE
COUNTY COMMISSIONERS

SCALES AS NOTED

Approved: 12-29-36

Elbert M Cooke Jr
Chairman, Board of County Commissioners

George W Jones
County Commissioner

County Commissioner

Submitted for Approval: 12-27-36

P O Marden
County Engineer

Engineer & Contractor: E. J. Cross Co, Worcester, Mass.

DAM NO. 61-16

FIGURE B-3

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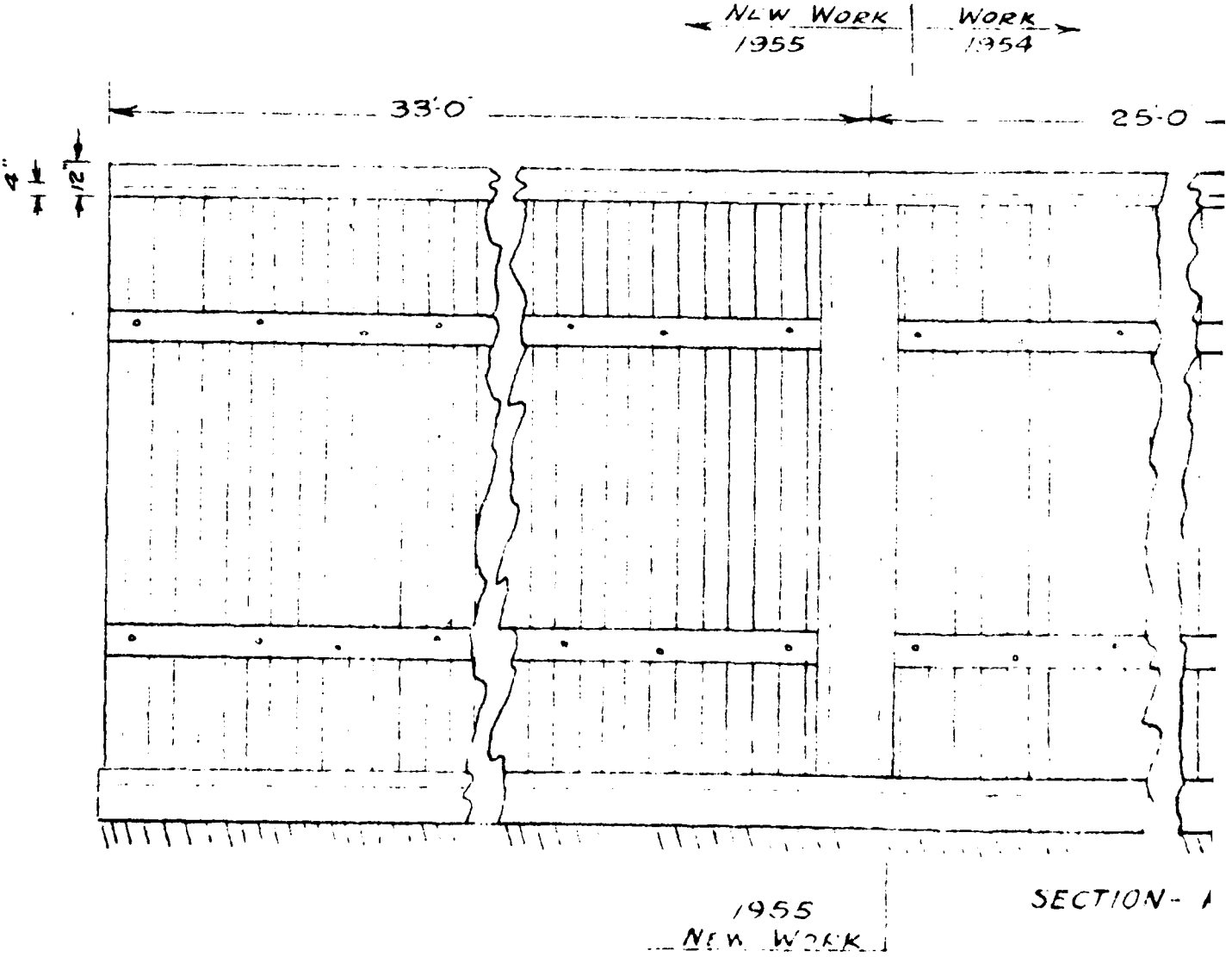

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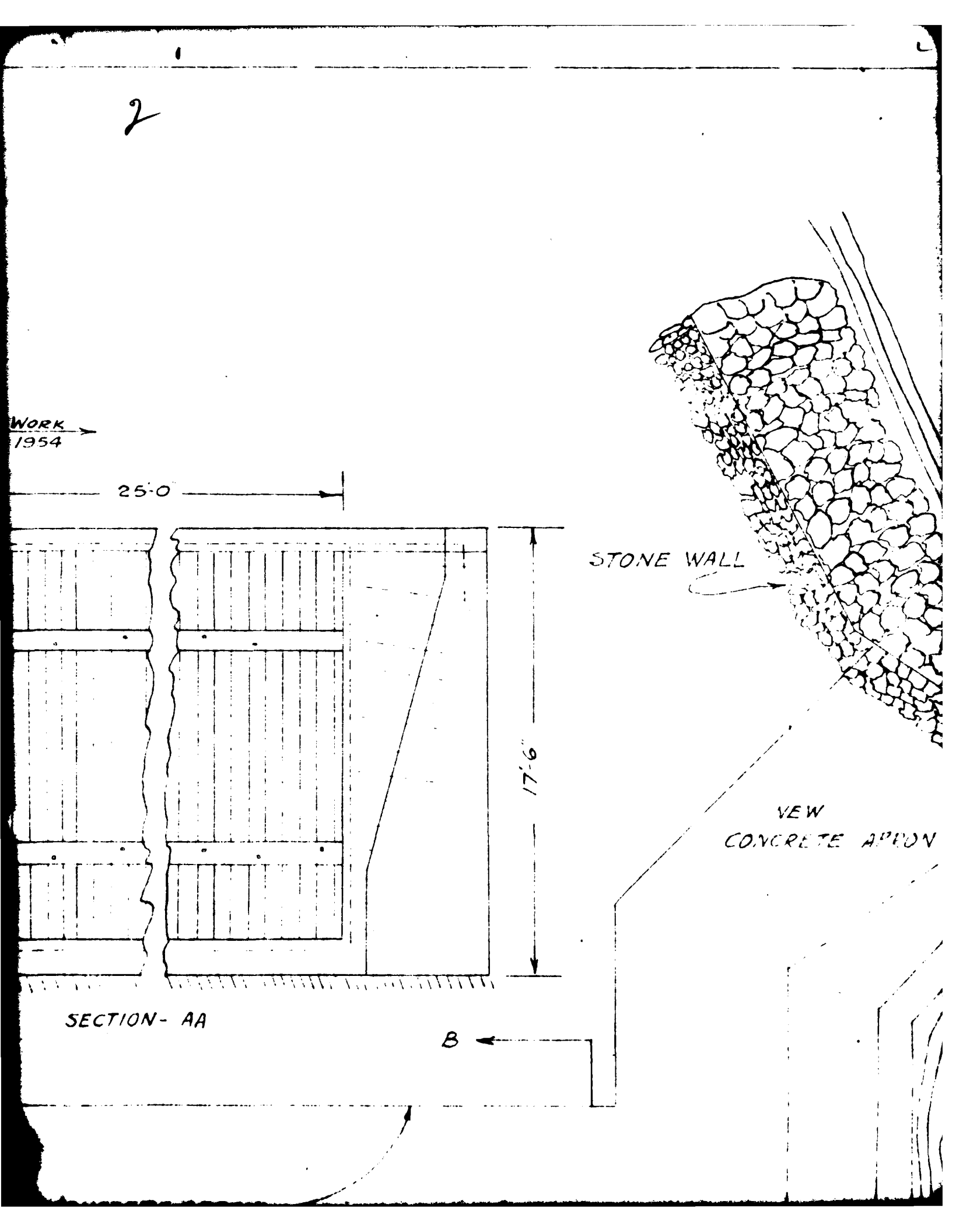

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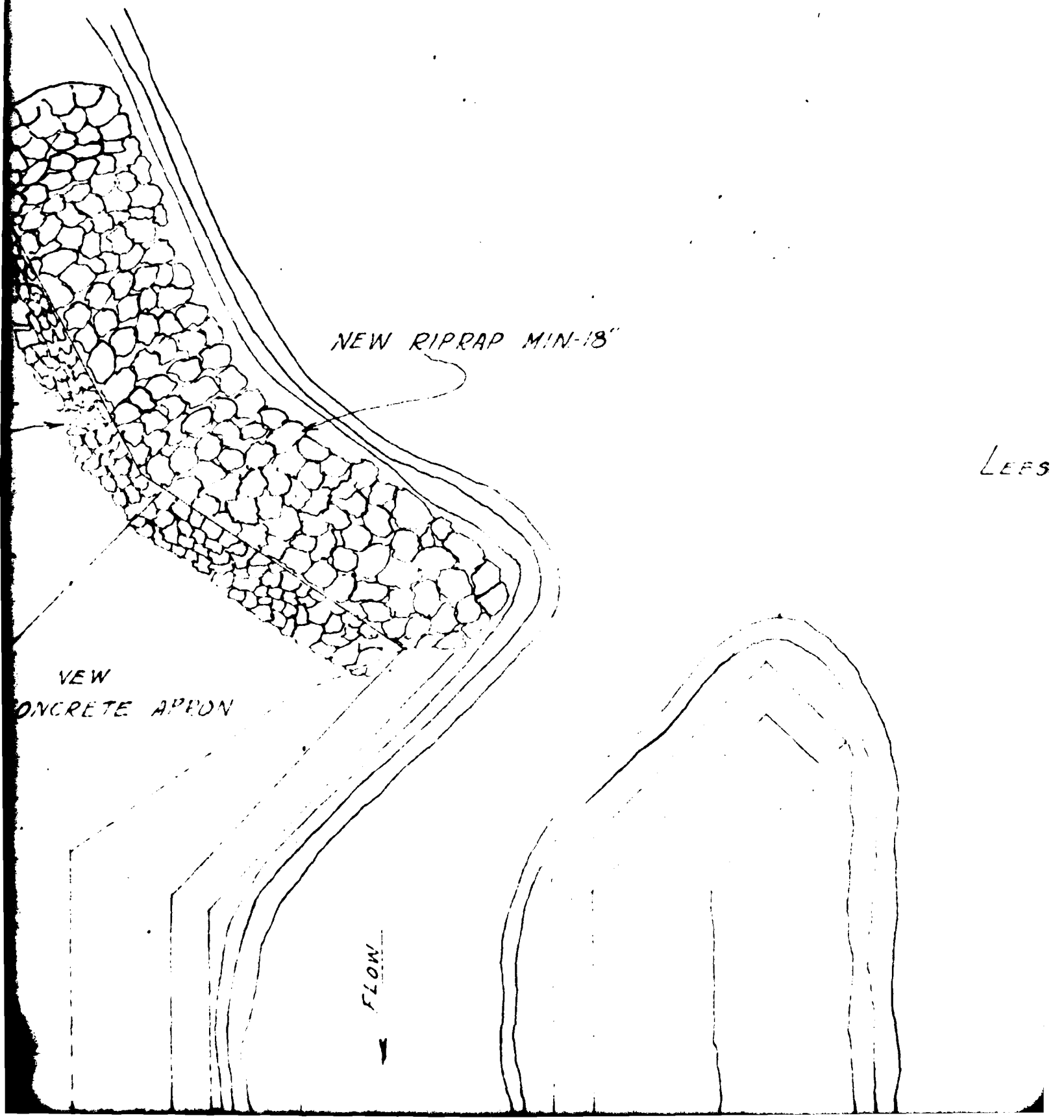

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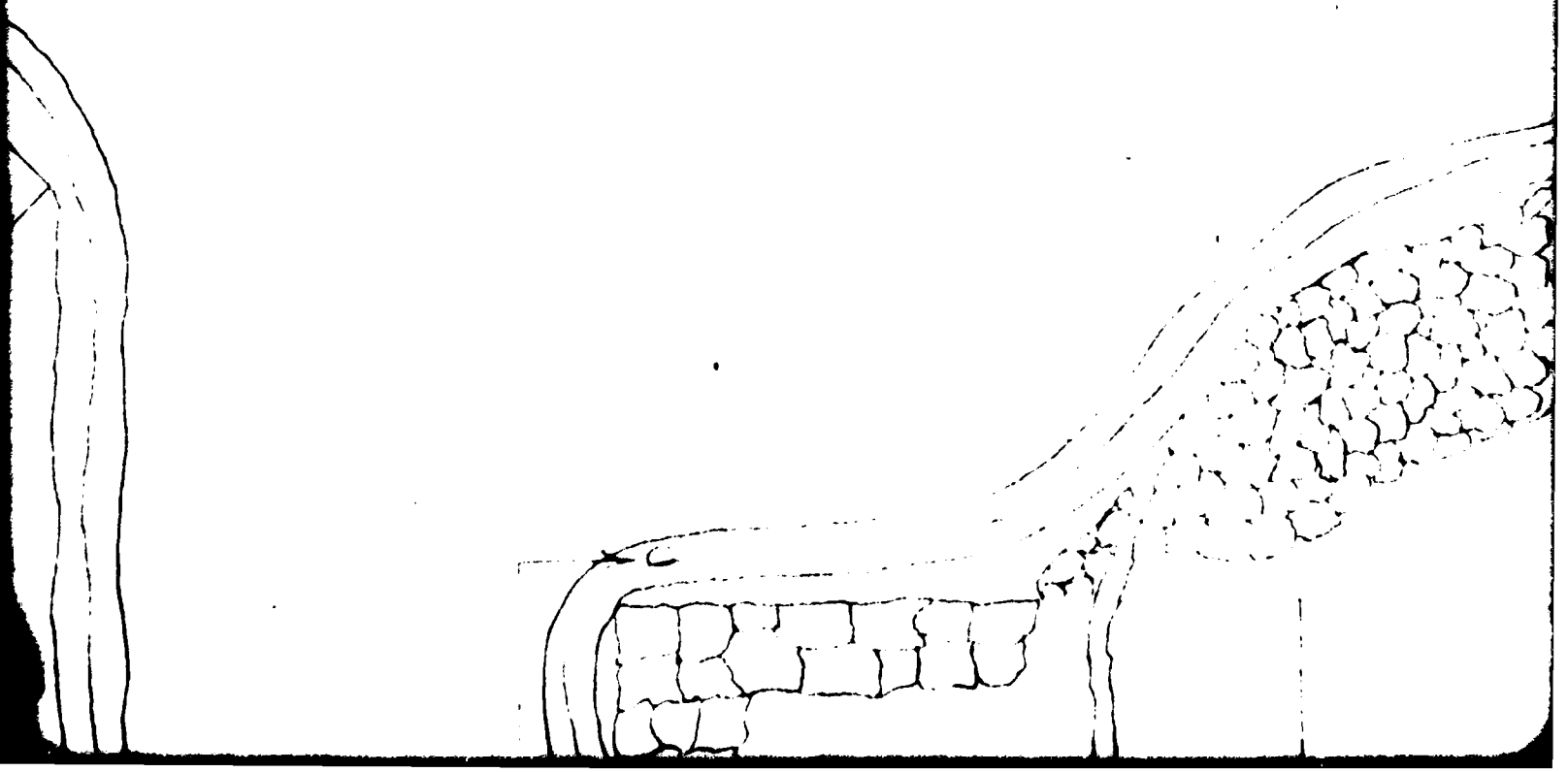
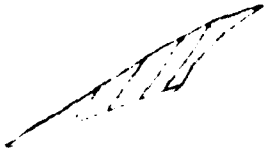
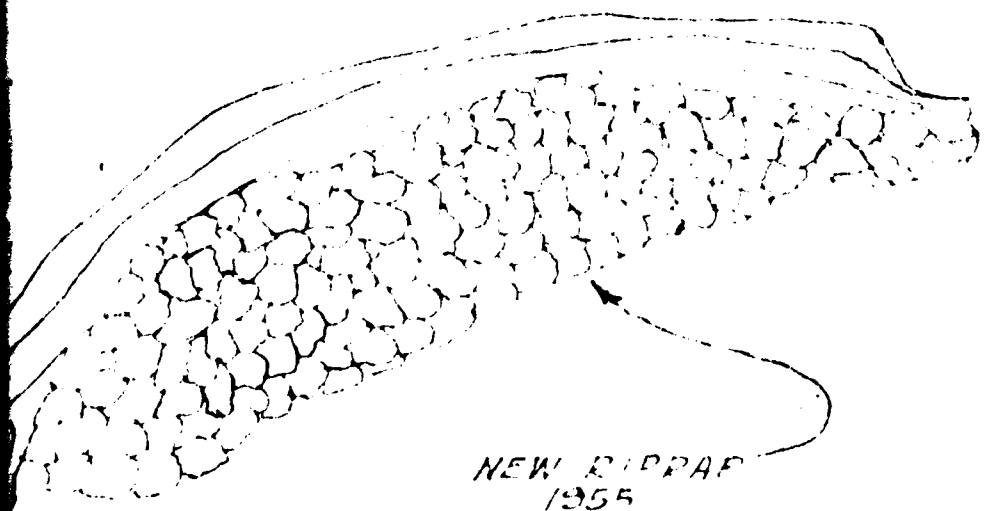
LEESVILLE POND

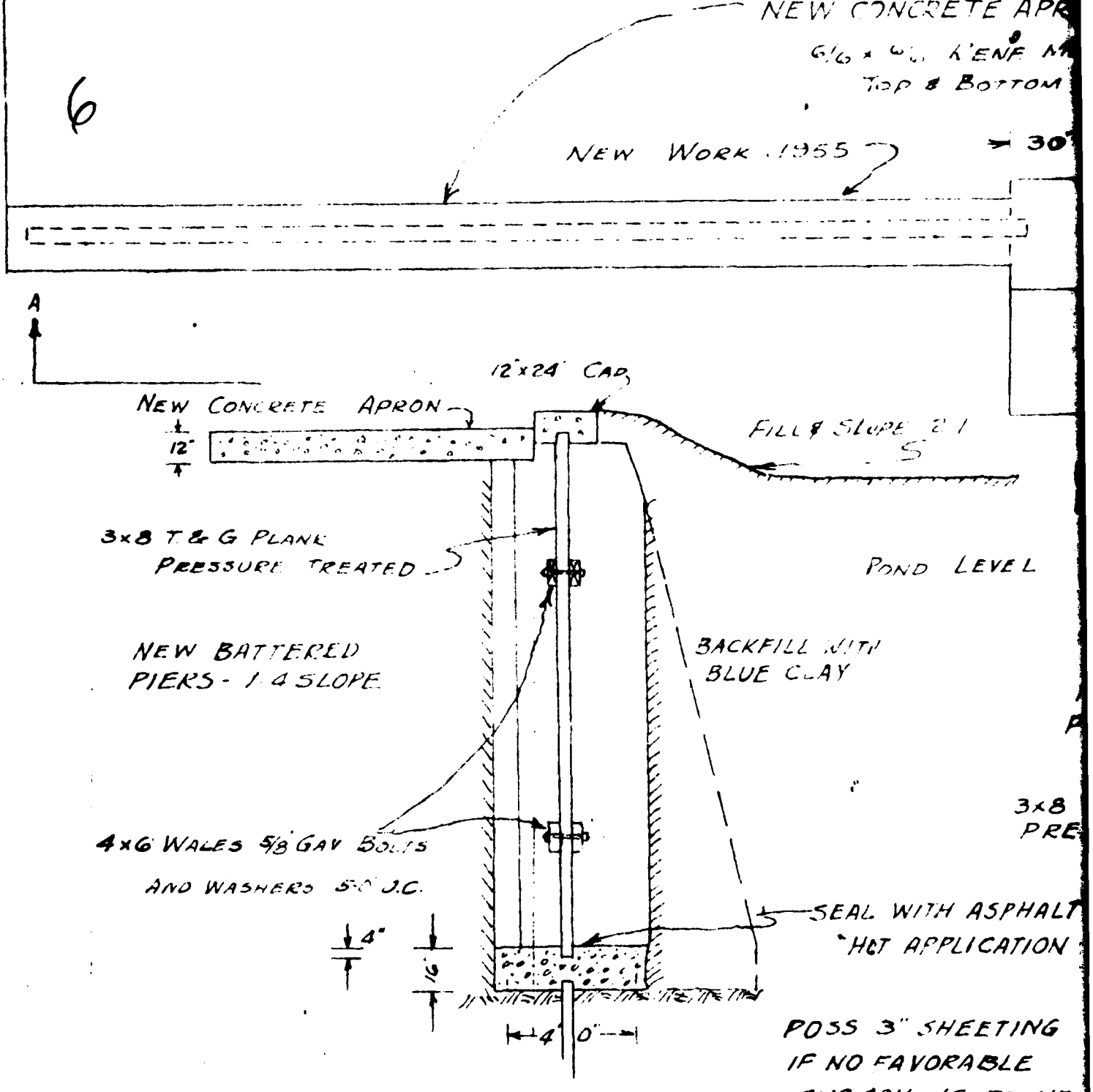




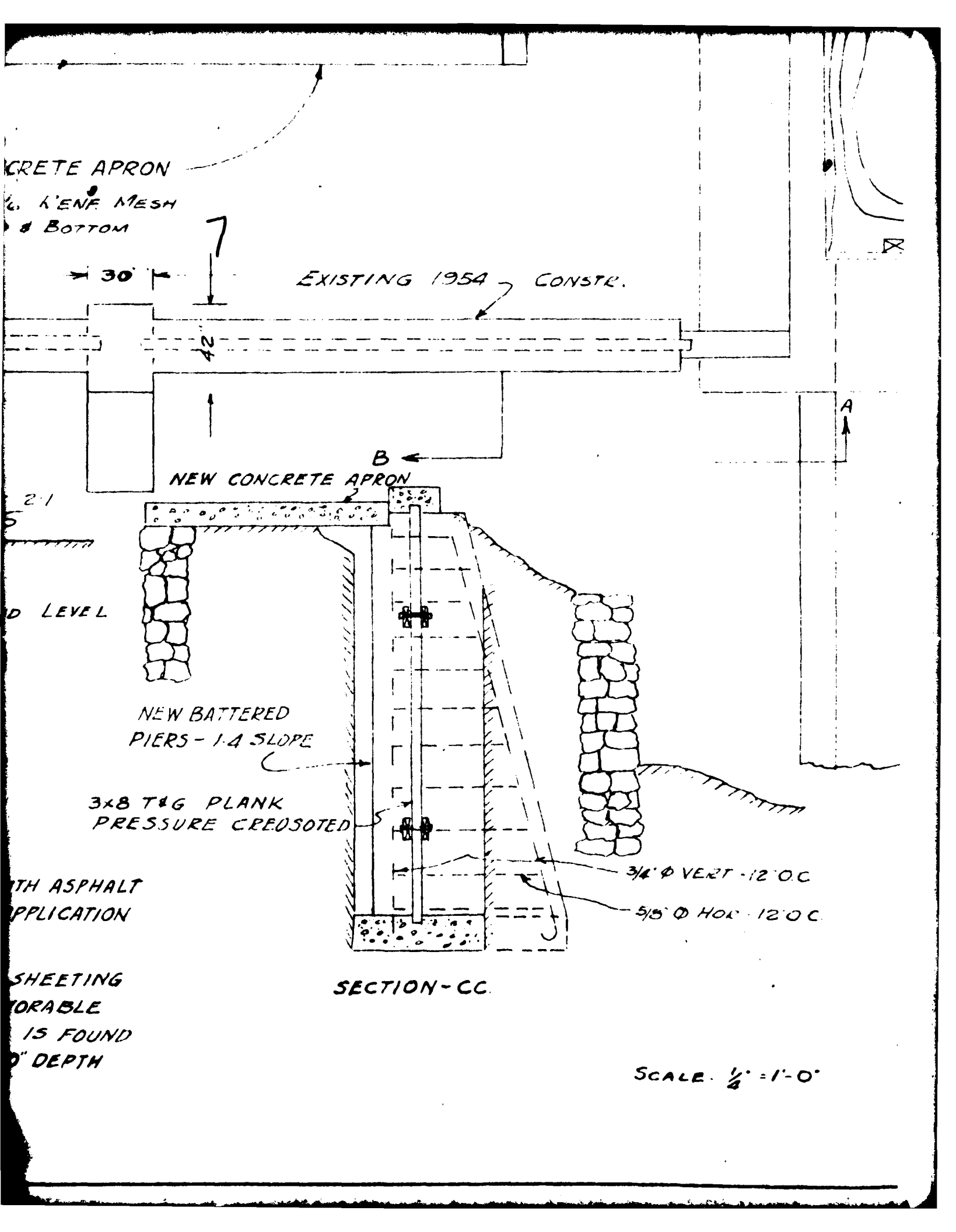


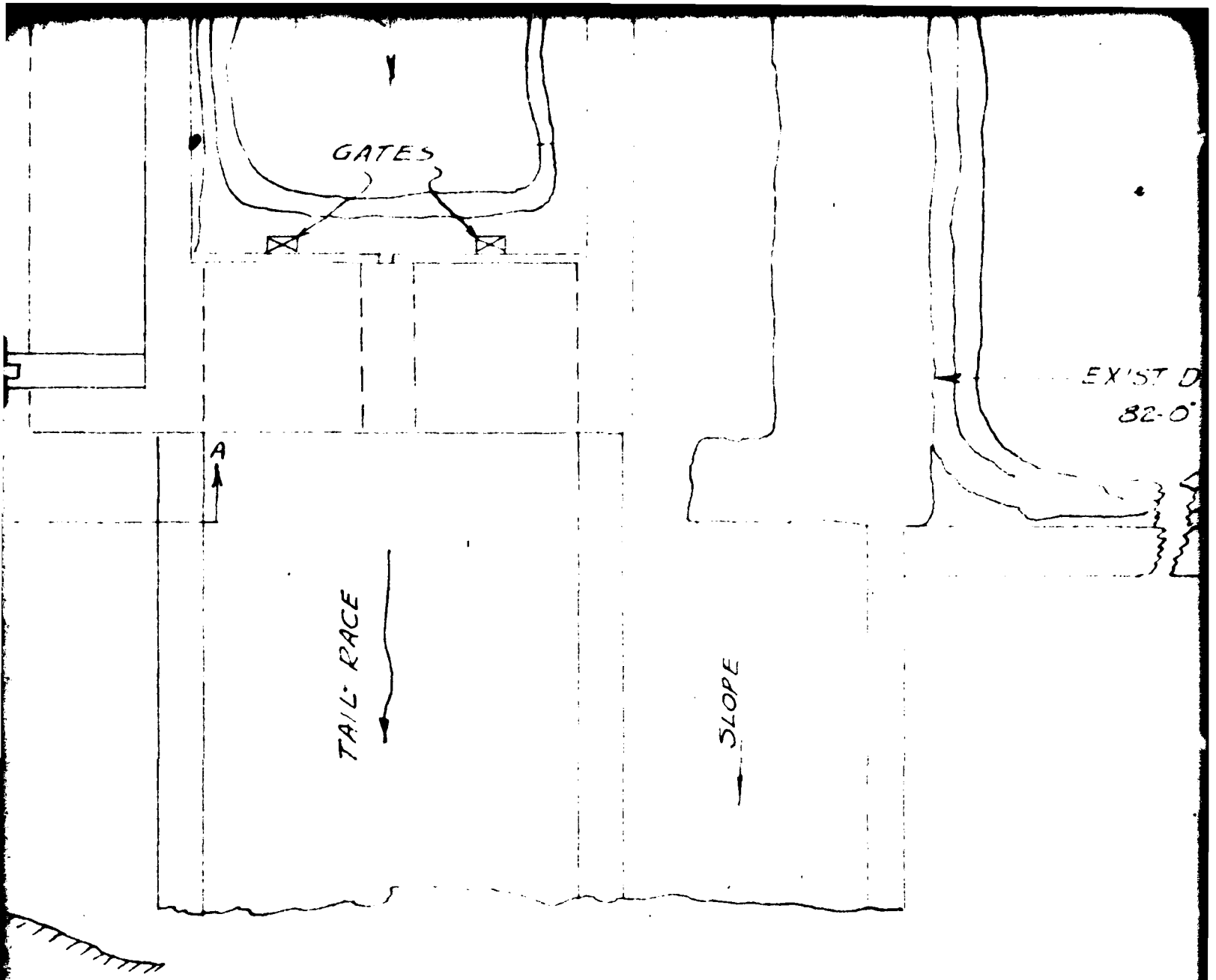
NEW EDPAF
1955

6


NEW CONCRETE APR
6/6 x 6/6 WIRE M
TOP & BOTTOM
NEW WORK 1955
30'
A
12'x24' CAP
NEW CONCRETE APRON
12"
FILL & SLOPE 2:1
3x8 T & G PLANK
PRESSURE TREATED
POND LEVEL
NEW BATTERED
PIERS - 1:4 SLOPE
BACKFILL WITH
BLUE CLAY
3x8
PRE
4x6 WALES 5/8" GAV BOLTS
AND WASHERS 5'-0" O.C.
SEAL WITH ASPHALT
"HOT APPLICATION
4"
16"
4'-0"
POSS 3" SHEETING
IF NO FAVORABLE
SUB SOIL IS FOUND
AT 16'-0" DEPTH

SECTION - BB


CRETE APRON
6. REINF MESH
& BOTTOM
30'
EXISTING 1954 CONSTR.
42"
A
B
NEW CONCRETE APRON
2:1
D LEVEL
NEW BATTERED
PIERS - 1:4 SLOPE
3x8 T&G PLANK
PRESSURE CREOSOTED
3/4" Ø VERT - 12" O.C
5/8" Ø HOR - 12" O.C
TH ASPHALT
PPLICATION
SHEETING
ORABLE
IS FOUND
0" DEPTH
SECTION - CC
SCALE. 1/4" = 1'-0"



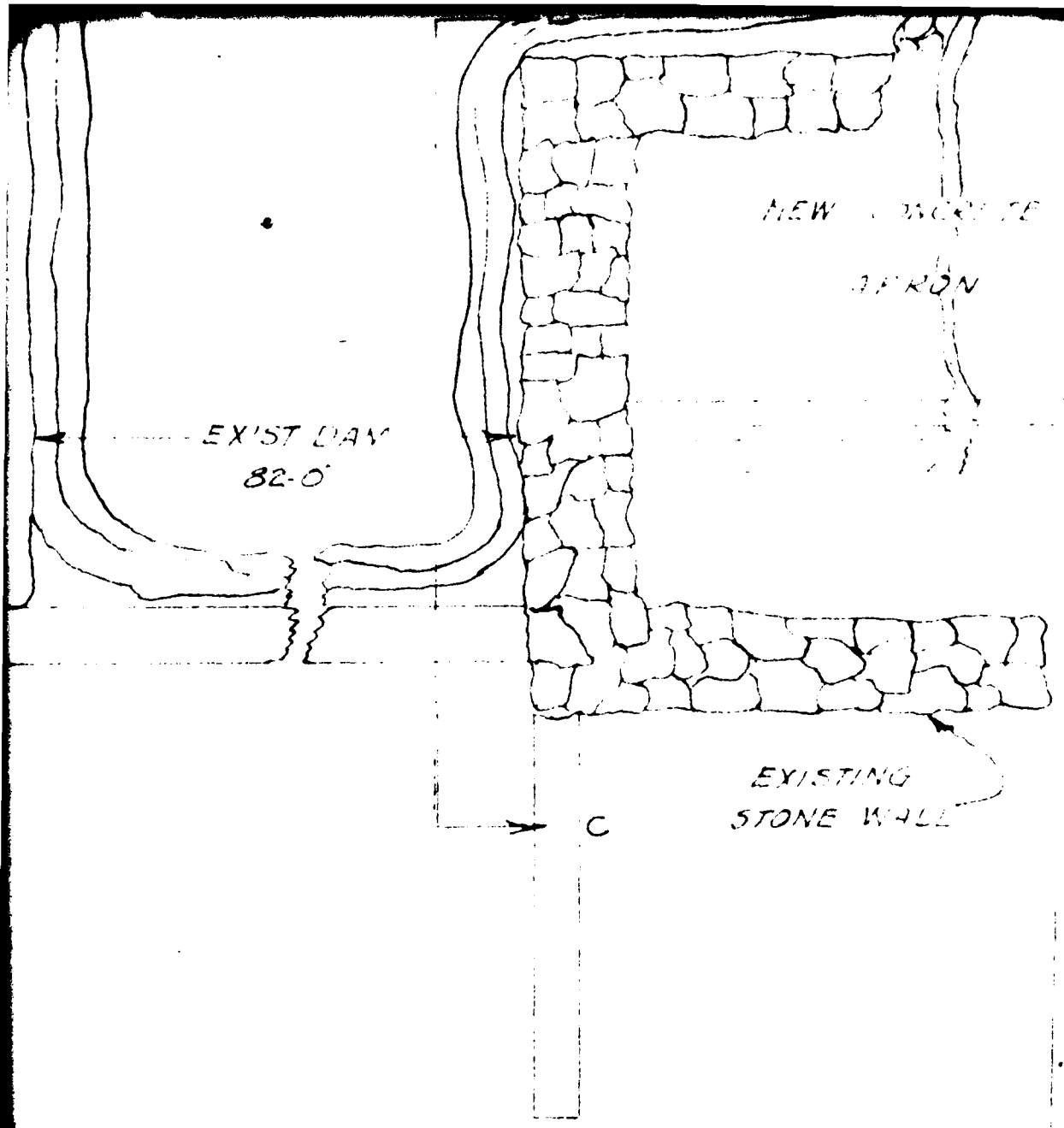
VERT - 12" O.C

HOR - 12" O.C.

8

E: ½" = 1'-0"

Note Mass Dept of Pub



WORCESTER
WORCESTER COU
PLAN OF F
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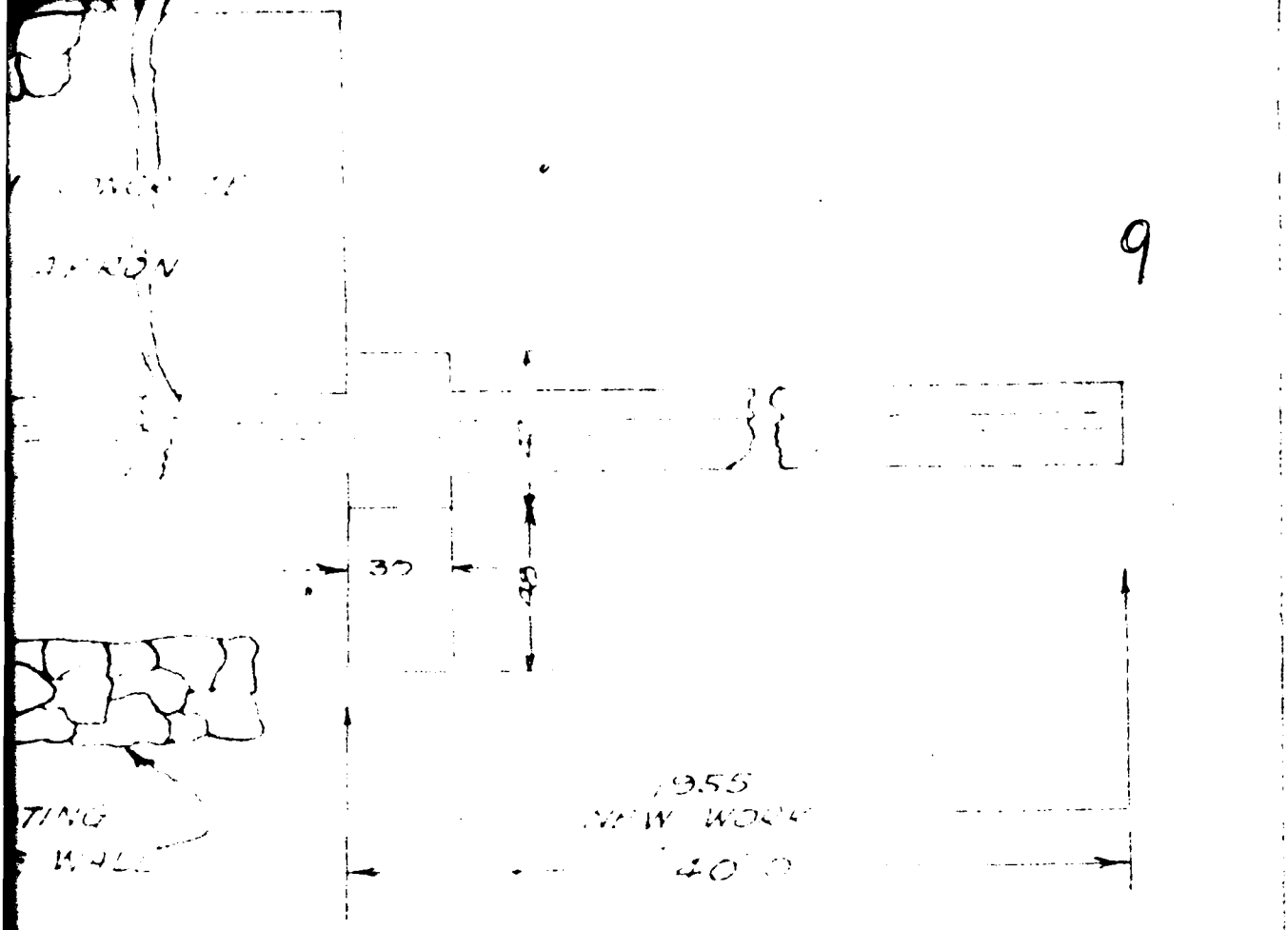
WORCESTE
AS FILED A
COUNTY
SC

APPROVED

Note Mass Dept of Public Works 1953 Specifications to Govern



WORCESTER COUNTY COMMISSIONERS
WORCESTER COUNTY ENGINEERING DEPARTMENT
PLAN OF RECONSTRUCTION OF DAM
ON LEESVILLE POND
WORCESTER, MASS.
FOR THE
WORCESTER RENDERING COMPANY
AS FILED AND APPROVED BY THE
COUNTY COMMISSIONERS
SCALES AS NOTED

APPROVED CHAIRMAN	SUBMITTED Dec 19
	COUNTY ENGINEER
	ENGINEERS R.H. WHITE CONSTR. CO.
	DAM NO. 61-15

FIGURE B-4

TOWN OR CITY Worcester DECREE NO. PLAN NO. 11.1 DAM NO. 369-15

LOCATION Leesville pond - Webster St. C. C. DOCKET NO.

DESCRIPTION OF DAM

Type	Earth Mortgerly stone abt. stepped stone spillway 65': vert. walls 29'
Length	150'±
Height	12'±
Thickness top	20'±
" bottom	spill - 30'± 35'±
Downstream Slope	stepped & vertical.
Upstream "	prob 2:1.
Length of Spillway	El. crest 97.0 94'±
Size of Gates	one No. end 42"- one spill- 42" El 88.0
Location of Gates	
Flashboards used	El. 99.0 wood. Yes.
Width Flashboards or Gates	24"
Dam designed by	Unknown.
" constructed by	
Year constructed	

GENERAL REMARKS

Lowell Fertilizer Co - owners.
1928 Worcester Rendering Co., owners.
818 Southbridge St., Worcester
OWNER - ELI JACOBSON - 5 ROLLINGWOOD DR -

Dec. 17, 1925. X L.O. Marden.
Inspected: Oct. 27. 1928 - X L. O. Marden.
" : Jan 2, 1929 - X " " "
(over)

DESCRIPTION OF RESERVOIR & WATERSHED

Name of Main Stream	—
" " any other Streams	
Length of Watershed	(Traced and Approved)
Width " "	
Is Watershed Cultivated	
Percent in Forests	
Steepness of Slope	
Kind of Soil	Ledge - Hardpan
No. of Acres in Watershed	31.27 Sq M
" " " " Reservoir	26
Length of Reservoir	
Width " "	
Max Flow Cu. Ft per Sec.	
Head or Flashboards-Low Water	
" " " -High "	

GENERAL REMARKS

Inspected: Feb. 25. 1929 X L. O. Marden.
" : Mar. 7, 1929 X " "
" " June 26. " " "
" " Dec. 17, 1931 - " "
" : Mar. 18, 1936 - L.O.M., Mr. Fish
" : Mar. 24, 1937 - " R. Cross, Mr. Seeman.
" : Jan. 5, 1937 - " R. V. Cross
1936 Flood 469.5 2.0 above crest of Dam

2-Library Bureau 10-92200

PREVIOUS INSPECTIONS (PARTIAL LISTING)

COPY OF INSPECTION CARD ON FILE AT THE MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS, DISTRICT OFFICE, WORCESTER.

61-15

Inspected: Jan. 6, 1937 - L.O.M., E.M. Crockett

New Plans & Specs approved: 12-29-36 by C.C.

Inspected: Nov. 23, 1935 L.O.M., Cross to Mr Fish
" : April 14, 1936 " " Mr. Fish
" : June 23, 1937 " " E.M. Crockett
" : May 6, 1937 " " R.V. Cress
" : Nov. 18, 1938 L. H. Spofford
" : Dec. 9, 1940 " "
" : Dec. 11, 1945 - W.O. Lindquist

1936 Repairs: new gates & frame

April 2, 1973

Mr. Eli Jacobson
5 [illegible] Drive
Worcester, Massachusetts

RE: Inspection-Dam #3-14-3[illegible]-15 (14)
Worcester
[illegible] Dam

Dear Mr. Jacobson:

An engineer from the Massachusetts Department of Public Works has inspected the above dam, of which you are the owner.

The inspection was made in accordance with Chapter 253 of the Massachusetts General Laws, as amended by Chapter 595 of the Acts of 1970.

The results of the inspection indicate that this dam is safe; however, the following conditions were noted that require attention:

1. Restore the eroded downstream slope at the westerly side of the dam.

2. Remove the growth of trees and brush from the embankment.

We call these conditions to your attention now, before they become serious and expensive to correct.

Very truly yours,

F. C. [illegible]

FRED. C. [illegible], P.E.
Deputy Chief Engineer

LM/afo
cc: G. M. [illegible] Dist. #3
A. [illegible] Dist. #3

INSPECTION REPORT - DAMS AND RESERVOIRS

1. Location: City/Town Worcester Dam No. 3-14-348-15

Name of Dam Leesville Inspected by Mullaney, Swanson, Maynard

Date of Inspection 1-23-73

2. Owner/s: per: Assessors _____ Prev. Inspection ✓

Reg. of Deeds _____ Pers. Contact _____

1. Est Jackson 5 Rockwood Rd Worcester
Name St. & No. City/Town State Tel. No.

2. _____
Name St. & No. City/Town State Tel, No.

3. _____
Name St. & No. City/Town State Tel. No.

3. Caretaker (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Name: St. & No.:

City/Town: State: Tel.No.:

4. No. of Pictures taken _____

5. Degree of Hazard: (if dam should fail completely)*

1. Minor _____ 2. Moderate ✓

3. Severe _____ 4. Disastrous _____

* This rating may change as land use changes (future development)

6. Outlet Control: Automatic _____ Manual ✓

Operative _____ yes; _____ No.

Comments:

7. Upstream Face of Dam: Condition:

1. Good ✓ 2. Minor Repairs _____

3. Major Repairs _____ 4. Urgent Repairs _____

Comments:

DAM NO. 3-14-348-13

8. Downstream Face of Dam:

Condition: 1. Good ✓ 2. Minor Repairs _____

3. Major Repairs ____ 4. Urgent Repairs _____

Comments:

9. Emergency Spillway: None

Condition: 1. Good ✓ 2. Minor Repairs _____

3. Major Repairs ____ 4. Urgent Repairs _____

Comments:

10. Water Level at time of inspection: 5' ft. above____below ✓

top of dam ✓ principal spillway_____

other_____

11. Summary of Deficiencies Noted:

Growth (Trees and Brush) on Embankment YES

Animal Burrows and Washouts NONE

Damage to slopes or top of dam NONE

Cracked or Damaged Masonry NONE

Evidence of Seepage NONE

Evidence of Piping NONE

Erosion SOME ON DOWNSTREAM SLOPE BEHIND RETAINING WALL ON LEFT

Leaks NONE

Trash and/or debis impeding flow SMALL AMT OF DEBRIS

Clogged or blocked spillway NONE

Other _____

 DAM NO. 3-14-348-15

12. Remarks and Recommendations: (Fully Explain)

THE OVERALL GENERAL CONDITION OF THE DAM IS GOOD; THERE IS SOME DEBIS ON THE DOWNSTREAM FACE OF DAM THAT SHOULD BE REMOVED. EROSION OF THE SLOPE ON THE LEFT SIDE OF THE DOWNSTREAM FACE OF THE DAM SHOULD BE CORRECTED. THE CONCRETE SECTIONS OF THE DAM AND THE DOUBLE [illegible] APPEAR TO BE IN GOOD CONDITION

13. Overall Condition:

1. Safe ✓
2. Minor repairs needed ✓
3. Conditionally safe - major repairs needed
4. Unsafe
5. Reservoir impoundment no longer exists (explain)
   Recommend removal from inspection list

DESCRIPTION OF DAM

DISTRICT 3

Submitted by Mullaney, Donahue, Hilliard Dam No. 3-14-346-15

Date 1-23-73 City/Town Worcester

Name of Dam Leesville Dam

1. Location: Topo Sheet No. 21 B

Provide 8½" x 11" in clear copy of topo map with location of Dam clearly indicated.

2. Year built: _____ Year/s of subsequent repairs _____

3. Purpose of Dam: Water Supply _____ Recreational _____

Irrigation _____ Other ✓

4. Drainage Area: 31.27 sq. mi. _____ acres

5. Normal Ponding Area: 26 acres; Ave. depth _____

Impoundment: _____ gals.; _____ acre ft.

6. No. and type of dwellings located adjacent to pond or reservoir
4 wood frame
1 brick
_____ i.e. summer homes, etc. _____

7. Dimensions of Dam: Length 215'± Max. Height 16'

Slopes: Upstream Face 2:1 ± vert

Downstream Face 1:1

Width across top _____

8. Classification of Dam by Materials:

Earth ✓ Conc. Masonry ✓ Stone Masonry ✓

Timber _____ Rockfill _____ Other _____

9. A. Description of present land usage downstream of dam:

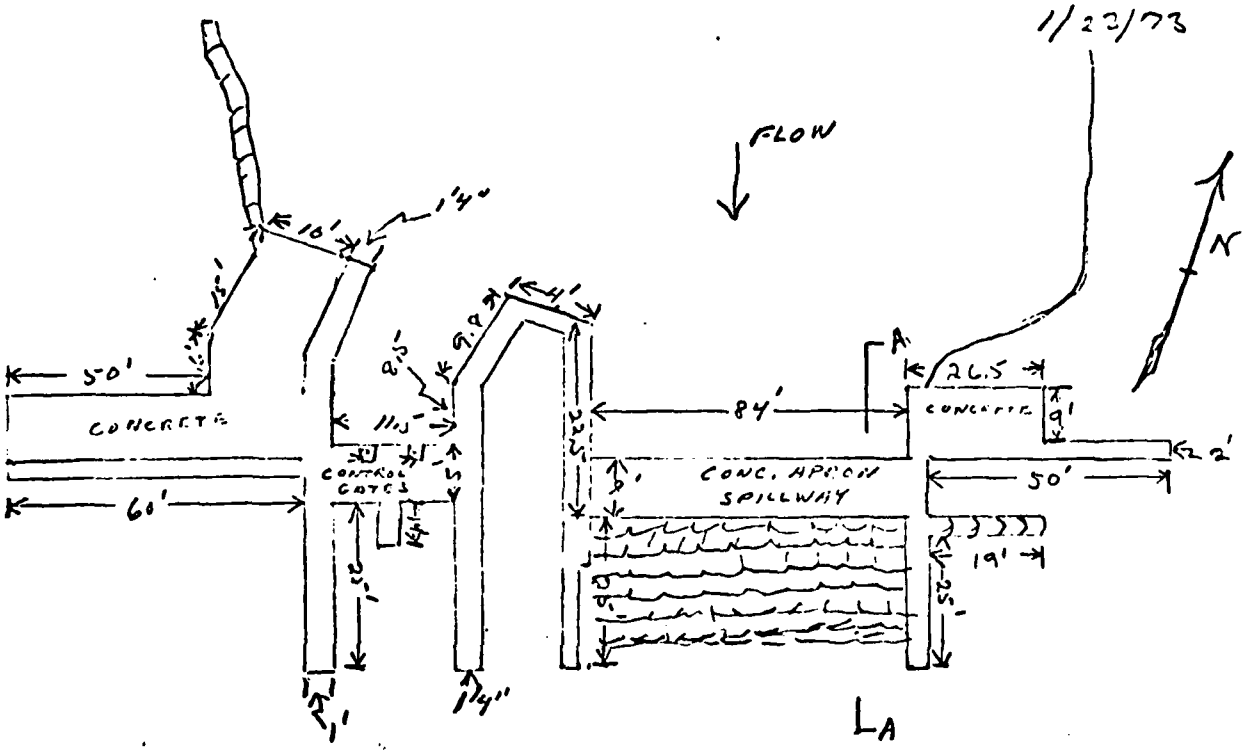
_____% rural; 100 % urban.

B. Is there a storage area or flood plain downstream of dam which could accomodate the impoundment in the event of a complete dam failure? yes ✓ no _____.

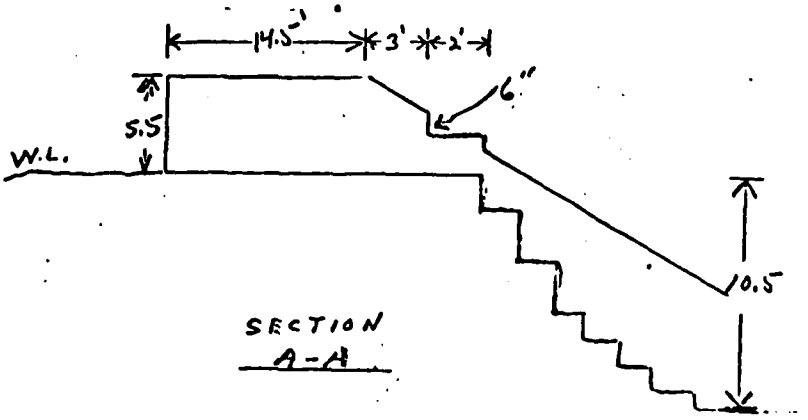
DAM # 3-14-341-15

LEESVILLE DAM

1/22/73



LA



SECTION A-A

DAM NO. 3-14-348-15

10. Risk to life and property in event of complete failure.

No. of people 20.

No. of homes 5.

No. of Businesses 1.

No. of industries NONE. Type _____

No. of utilities NONE. Type _____

Railroads NONE.

Other dams NONE.

Other _____.

11. Attach Sketch of dam to this form showing section and plan on 8½" x 11" sheet.

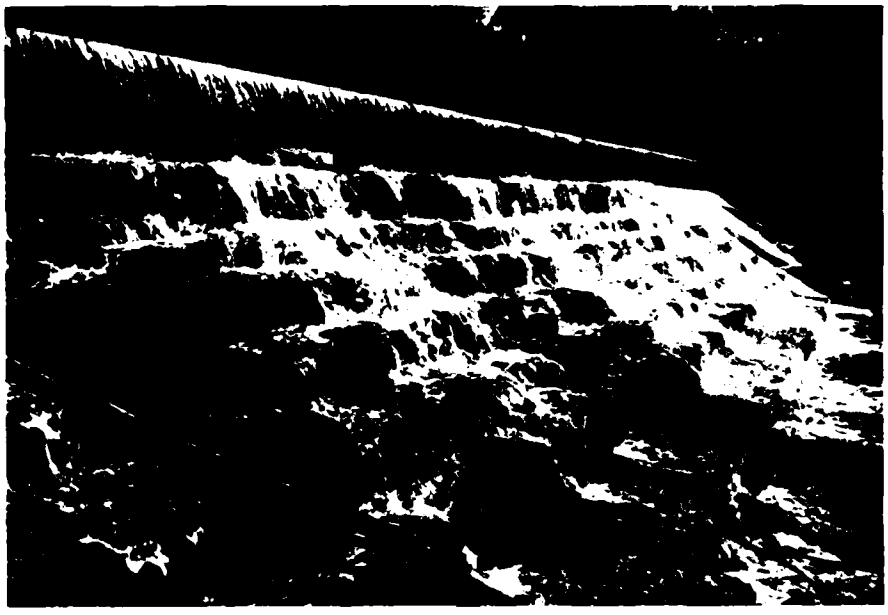
12. How to Locate:

TAKE WEBSTER ST PAST HOOD AVE APPROX. 200 ±

DAM VISIBLE ON LEFT.

APPENDIX C

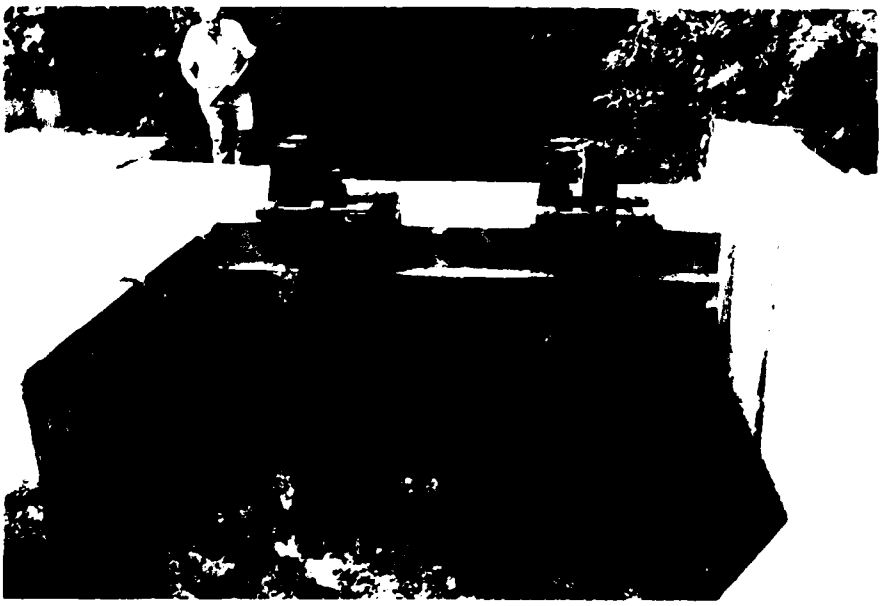
PHOTOGRAPHS



NO. 1 VIEW OF SPILLWAY CASCADE FROM NORTH ABUTMENT

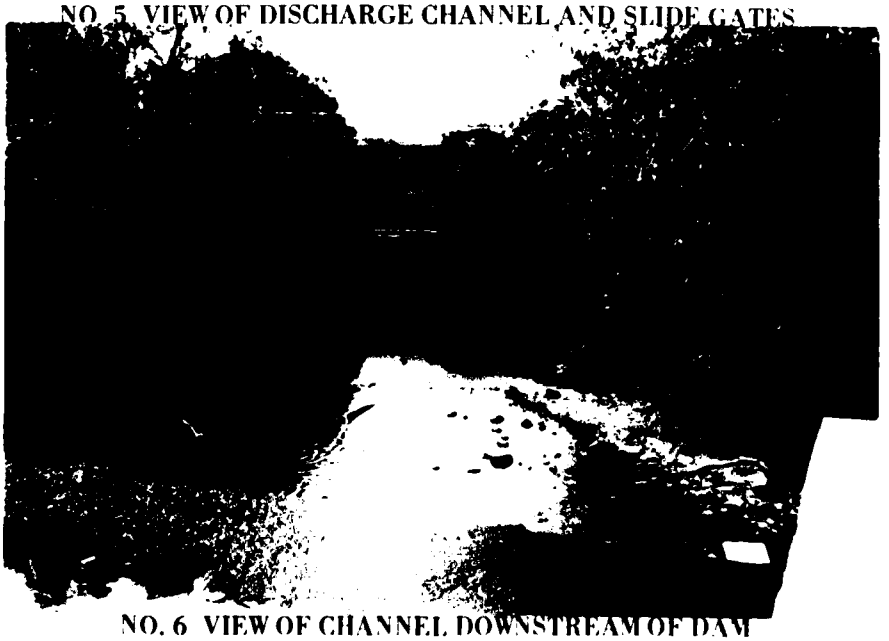
NO. 2 VIEW OF SPILLWAY FROM SOUTH ABUTMENT

NO. 3 VIEW OF DAM CREST FROM SOUTH ABUTMENT



NO. 4 VIEW OF INTAKE CHANNEL

NO. 5 VIEW OF DISCHARGE CHANNEL AND SLIDE GATES



NO. 6 VIEW OF CHANNEL DOWNSTREAM OF DAM

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

Project NATIONAL REVIEW OF NON FED DAMS Acct No. 5864 Page 1 of 5
Subject WORCESTER MASS AREA Comptd By LEB Date 7/13/78
Detail LEESVILLE POND DAM Ck'd By RW Date 8/17/78

(I) Inflow Test Flood & 100 Year Flood

A - Data taken from U.S.C. of E Report:
Blackstone River Flood Control
Worcester Diversion
Design Memorandum No. 1
Hydrologic Analysis

P.M.P. based flood gives 31,000 cfs as peak which would be based on a 24.32 inch rainfall in 24 hours with a max. 6 hour rain of 19 inches & 3 hr max of 14.25 inches
The Design Storm used in the project (SPF) had a peak of 8000 cfs and is based on a 11.0 inch 24 rain, a max. 6 hr. rain of 8.35 inches and a max. 3 hr rain of 6.68 inches
Drainage area is 32.1 sq. miles.

B - Due to low height of dam use ½ PMF as Inflow Test Flood

∴ Possible Inflow Test Flood = 15,500 cfs. (Max out diversion)

C - Diversion Effect
Above C of E report provides a rating curve for diversion tunnel & control dam just up stream of Leesville Dam. At 15500 cfs, the pond level at the diversion is El. 501. The ℄ of the tunnel exit is 510. Under an 86' head the diversion flow is 6340 cfs. Subtracting this from 15500 cfs gives:

∴ Inflow Test Flood = 9160 cfs

D - 100 Year Flood

For 4.7 inches of rain in 6 hours, less a minimal infiltration loss of 1.1 inches, the 100 year flood inflow peak is

Peak Inflow $Q_{100} = 31000\left(\frac{4.7-1.1}{19-1.1}\right) = 6234$ cfs.

Rating curve of diversion structure and control dam indicates that with this rate of inflow, the diversion would be about 6000 c.f.s.

Thus Inflow 100 year flood = 234 c.f.s.

E - Storage Function

For Inflow Test Flood: $Q_{out} = 9160 - \frac{9160}{9.5}(S) = 9160 - 964\,S = E_1$

METCALF & EDDY, ENGINEERS

Project Nat. Review of Non Fed Dams Acct No 5864 Page 2 of 5
Subject Worcester Mass Area Compld By CSB Date 7 2 [illegible]
Detail LEESVILLE POND DAM Ck'd By RW Date 9 [illegible]

(II) Spillway, Dam Crest Capacity & Storage Function

For Broad Crested spillway: $Q_s = 3.12(84) H_s^{1.5} = 262 H_s^{1.5}$

For Dam Crest: $Q_c = 2.55[(13') H_{c_1}^{1.5} + (112') H_{c_2}^{1.5}]$

$H_s = 0$ @ Elev. 485, $H_{c_1} = H_s - 3.33'$, $H_{c_2} = H_s - 5.5'$

Pond Elev	Q_s	Q_c	Q_{TOT}	S	F_{TF}
485	0	—	0	0	
486	262	—	262	.037	
487	741	—	741	.082	
488	1361	—	1361	.135	
488.33	1594	—	1594		
489	2096	18	2114	.194	
490	2929	72	3001	.262	
491	3851	246	4097	.336	
492	4852	758	5610	.419	8756
493	5928	1464	7392	.508	8670
493.6	6608	1960	8568	.566	8614
494	7074	2317	9391	.606	8576

S = Pond Storage in terms of inches on total drainage area

D = Depth in pond above spillway crest in feet ($D = H_s$)

Pond area = 0.09 mi² @ elev. 485 to 0.14 mi² @ elev. 490

∴ Area = $[0.09 + D(.01)]$ mi²

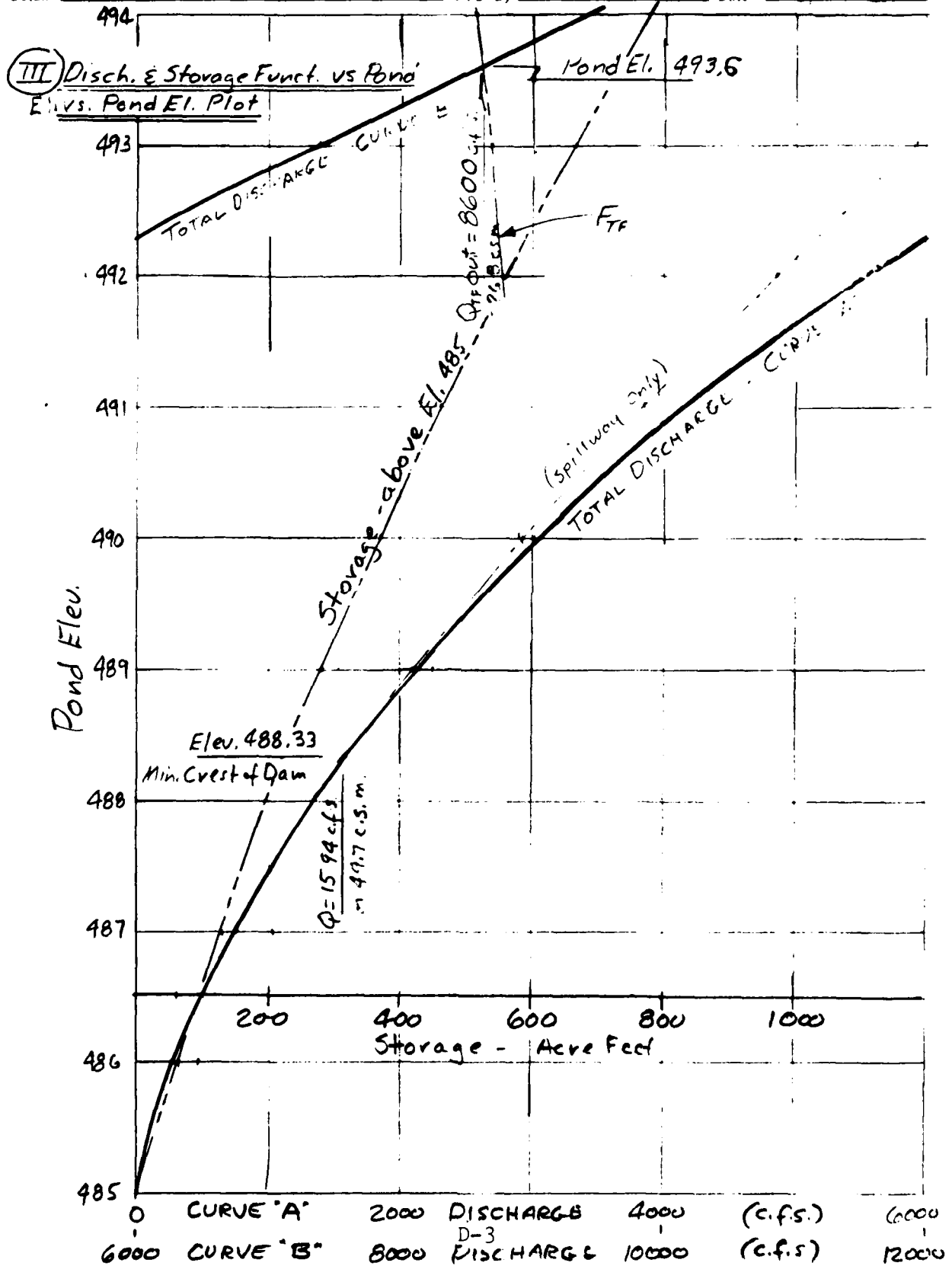
& $S = 12\left(\frac{.09 + D.01}{32.1}\right)D$

METCALF & EDDY, ENGINEERS

Project Nat. Review of Non Fed. Dams Acct No 5864 Page ___ of ___

Subject Worcester Mass Area Compld By LEB Date 7/25/7?

Detail LEESVILLE POND DAM Ck'd By ___ Date ___



METCALF & EDDY, ENGINEERS

Project Nat. Review of Non Fed. Dams Acct No 5064 Page ___ of ___
Subject Worcester, Mass. Area Compld By LEB Date 7/25/79
Detail LEESVILLE POND DAM Ck'd By ___ Date ___

(IV) Crest Flow

Under Test Flood Discharge

Total Q_{out} = 8600 (from Item (III))
Spillway = 6493
∴ Total Crest Flow = 2193

Depth above Crest 2 = 3', $q_c = 2.55(3)^{1.5} = 13.25$ cfs/ft.

Crit. Depth for q: $y_c = \left[\frac{(13.25)^2}{g}\right]^{1/3} = 1.76'$

Crit Vel. for q: $V_c = \frac{13.25}{1.76} = 7.53$ fps

(V) Low Outlet Discharge

Outlet consists of 2 - 5' x 5' sluiceways, Inv. el. 476.5
Normal Pond Level - el. 485
[I.f. Chow, "Open Channel Hydraulics", p. 378, Fig 17-29]
H = 8.1, H/d = 1.62, q = 56 cfs/ft.
Total Disch = (5+5)(56) = 560 c.f.s. = 17.44 c.s.m.
Above Disch. is 6.5% of Test Flood outflow

(VI) Storage

Pond area = 0.09 mi² @ El. 485 & 0.14 mi² @ El. 490
extrapolated as shown

Pond El.	Area	Incr. Vol (ac ft.)	Volume
485	0.09 mi²		0
		60.8	
486	0.10		60.8
		67.2	
487	0.11		128.0
		153.6	
489	0.13		281.6
		86.4	
490	0.14 mi²		368.0
		92.8	
491	0.15		460.8
		99.2	
492	0.16		560.0
		105.6	
493	0.17		665.6
		112.0	
494	0.18		777.6

METCALF & EDDY, ENGINEERS

Project Nat Review of Non Fed Dams Acct No 5864 Page 5 of 5
Subject Worcester Mass. Area Compld By LEB Date 7/25/78
Detail LEESVILLE POND DAM Ck'd By RW Date 9/10/79

(VII) Failure of Dam

Peak Failure Flow:

Pond Elevation - 488.3
Toe Elevation — 474.5
Y_o = 13.8

Dam Length Subject to Breaching = 139'
$W_o = 40\%(139) = 56'$

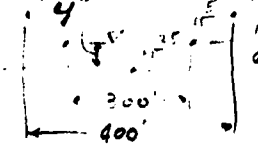
$$Q_{P_1} = 1.68\, W_o (Y_o)^{1.5} = 1.68(56)(13.8)^{1.5} = 4800 \text{ cfs}$$

Storage Volume Released:

Storage Above Spillway: From Graph = 220 Ac. ft.
Storage Below Spillway $\frac{1}{3}(.09)10.5(640)$ = 200 " "
S = Total Storage = 420 " "

Spillway Flow = 1600 cfs; T.W. = 5.8', A = 841; Q_1 = 6400

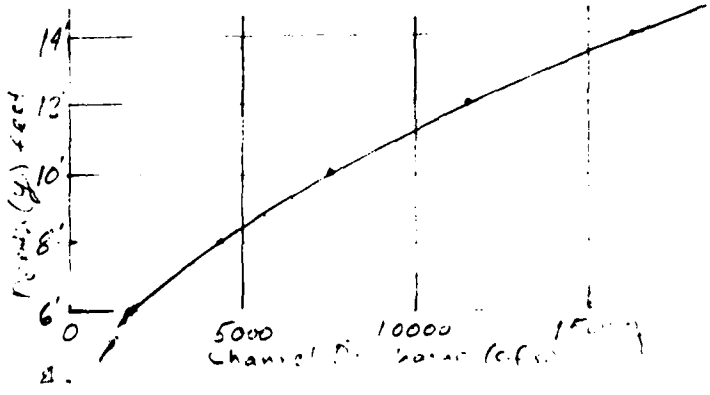
Channel Hydraulics: Slope = $\frac{3}{1900}$ = .0016; n = .06



$V = \frac{1.49}{n} R^{2/3} S^{1/2} = 1.0\, R^{2/3}$

y	A	P	$R^{2/3}$	V	Q
6'	900	300	2.04	2.08	1872
8'	1520	320	2.83	2.83	4295
10'	2180	340	3.45	3.45	7524
12'	2880	360	4.00	4.00	11520
14'	3620	380	4.50	4.50	16267
5'	625	250	1.84	1.84	1151

Channel Length 1900'



$Q_1 = 6400$; $y_1 = 9.4'$; $A_1 = 1978$ $\Delta Vol_1 = 50$ ac. ft.

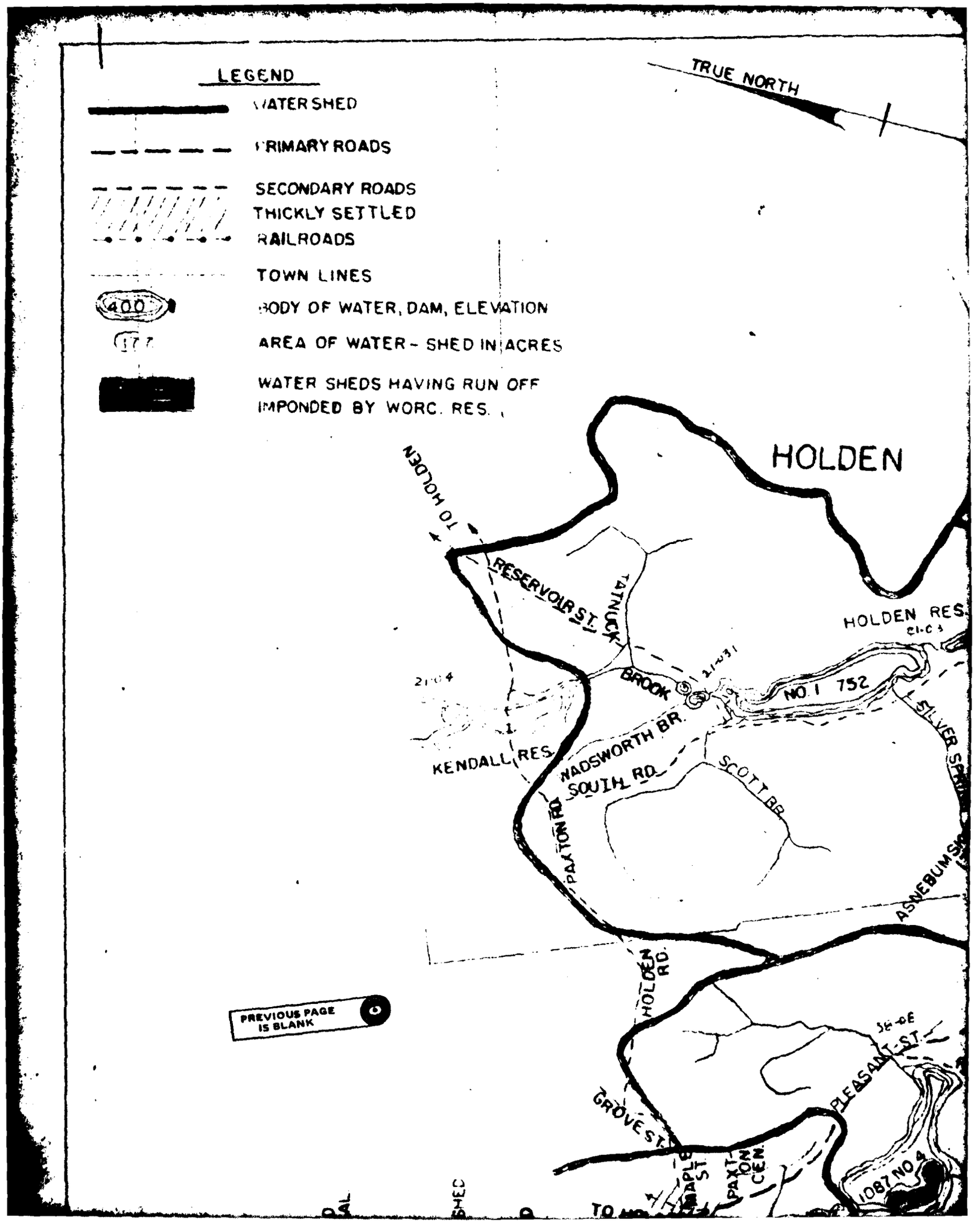
Trial $Q_2 = 6400\left(1 - \frac{50}{420}\right) = 5650$ cfs.; Wave Ht $\simeq 8.9'$, $A_2 = 1812$

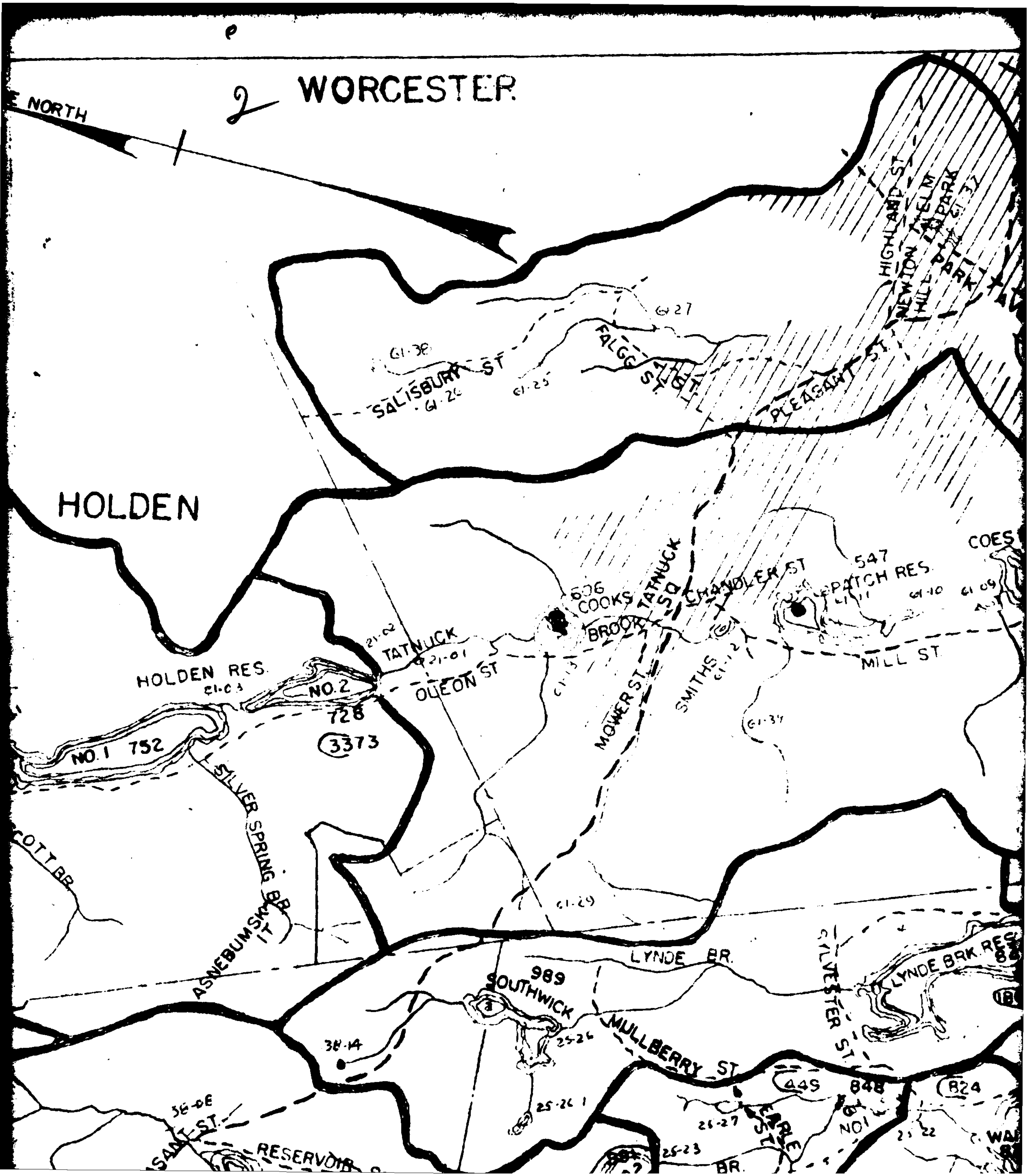
$\bar{A} = 1895$, $\Delta\bar{V} = 46$; $Q_{Final} = 6400\left(1 - \frac{46}{420}\right) = \underline{5700 \text{ cfs}}$; $y_F = 8.9'$, $\underline{\Delta y = 3.1'}$

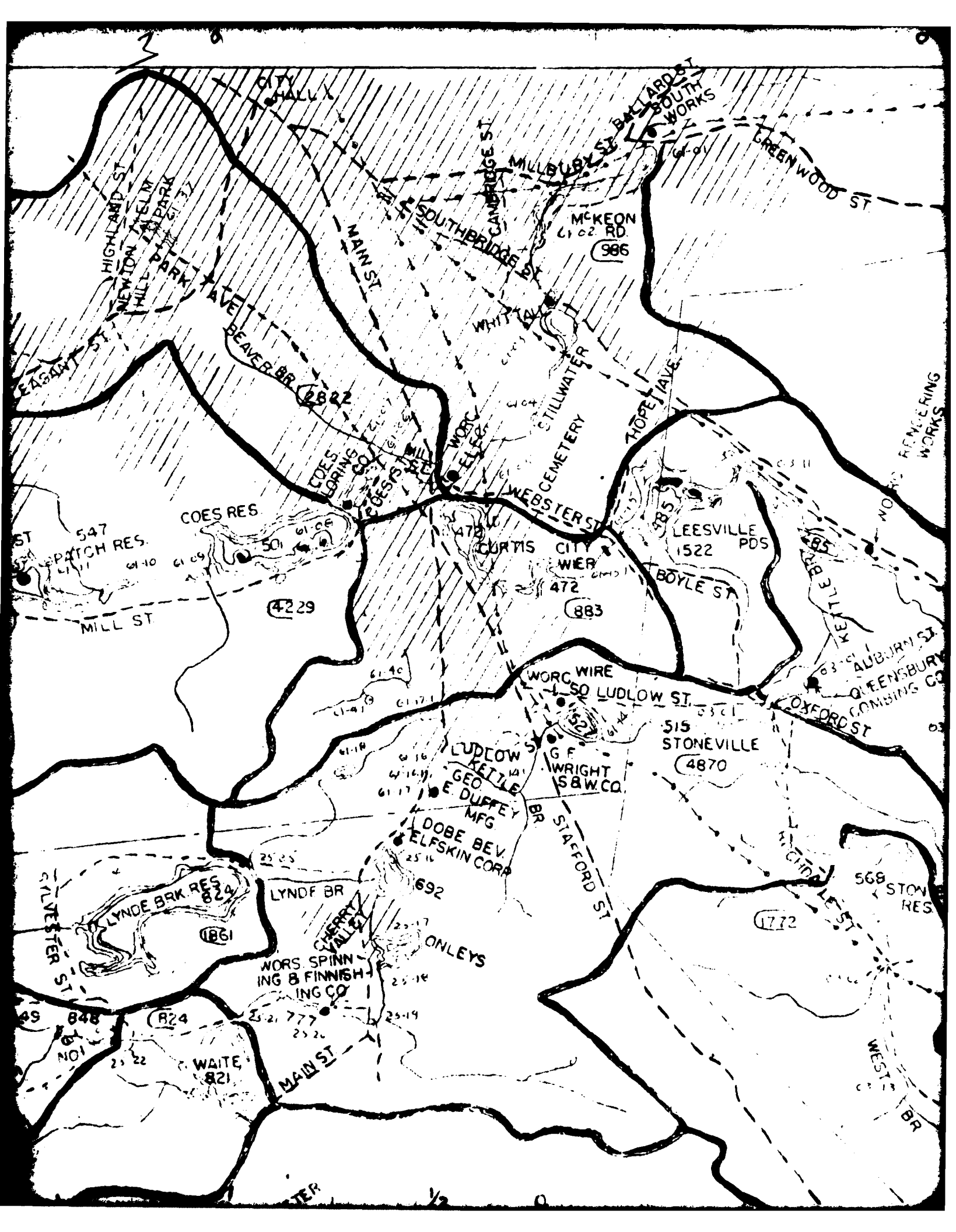
Time to Drain:

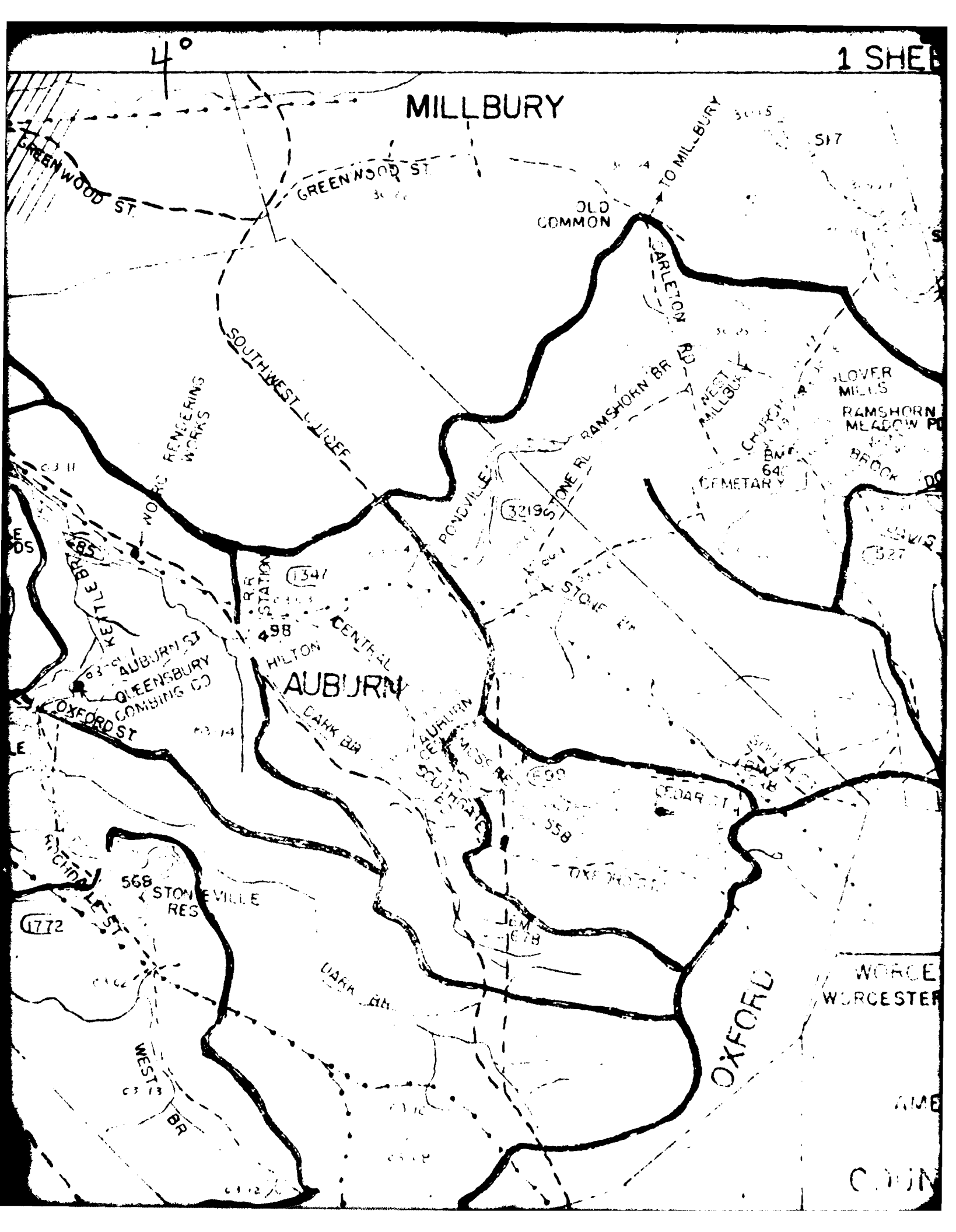
$$\frac{43560\ (840)}{3600\,(1/2)\,(4800)} = \underline{4.2 \text{ Hours}}$$

METCALF & EDDY, ENGINEERS


LEGEND
WATER SHED
PRIMARY ROADS
SECONDARY ROADS
THICKLY SETTLED
RAILROADS
TOWN LINES
400
BODY OF WATER, DAM, ELEVATION
AREA OF WATER - SHED IN ACRES
WATER SHEDS HAVING RUN OFF IMPONDED BY WORC. RES.
TRUE NORTH
HOLDEN
TO HOLDEN
RESERVOIR ST.
TATNUCK
BROOK
HOLDEN RES.
NO. 1 752
SILVER SPRING
KENDALL RES.
WADSWORTH BR.
SOUTH RD.
SCOTT BR.
PAXTON RD.
ASNEBUMSKIT
HOLDEN RD.
PLEASANT ST.
GROVE ST.
PAXTON CEN.
1087 NO 4
PREVIOUS PAGE IS BLANK

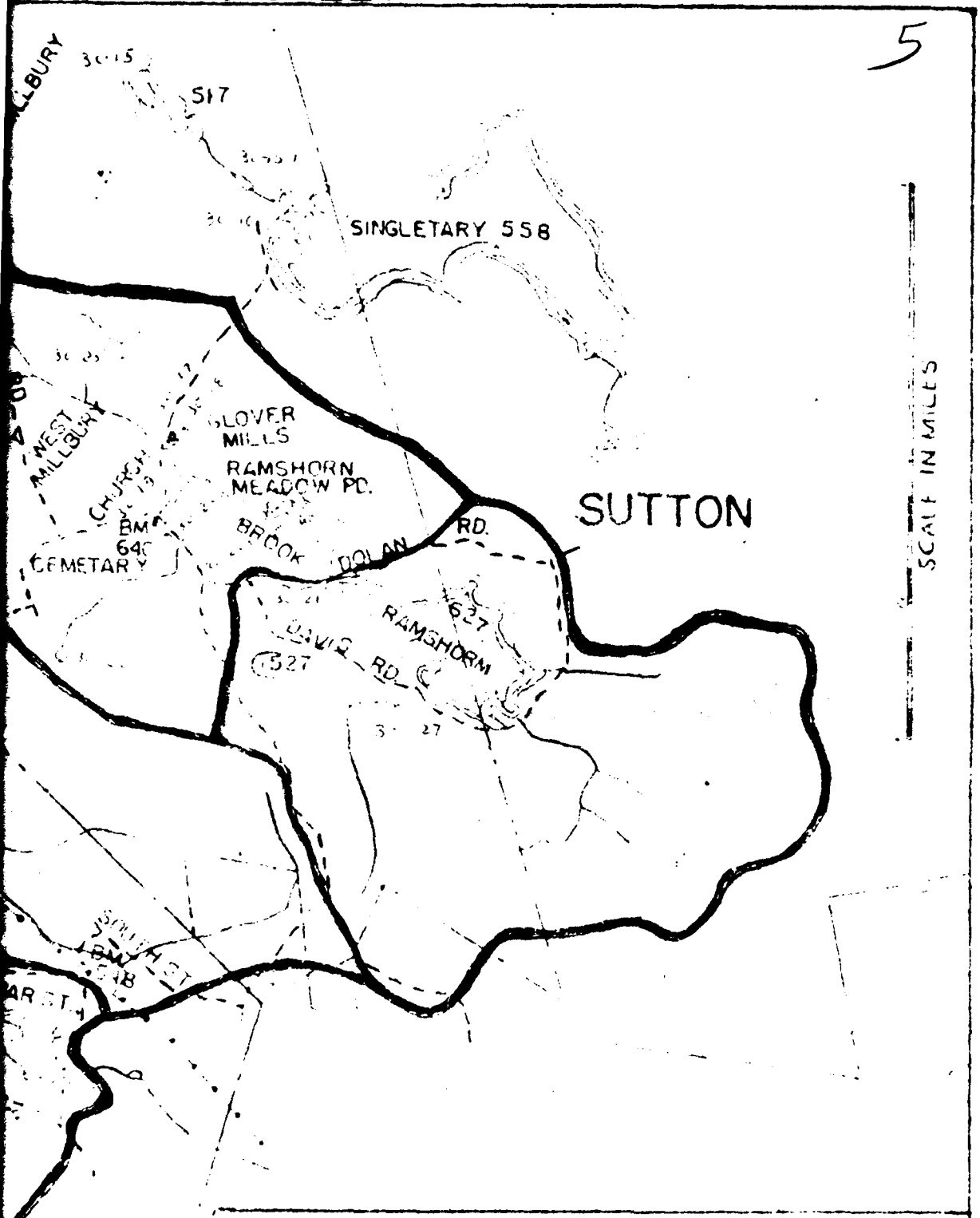

2
WORCESTER
NORTH
HOLDEN
SALISBURY ST
FALGG ST
PLEASANT ST
HIGHLAND ST
NEWTON
HILL PARK
PARK
HOLDEN RES.
NO.2
728
3373
NO.1 752
TATNUCK
QUEON ST
COOKS BROOK
TATNUCK SQ
CHANDLER ST
MOWER ST
SMITHS
547
PATCH RES.
MILL ST
COES
SILVER SPRING BR
ASNEBUMSKIT
LYNDE BR.
LYNDE BRK RES
989
SOUTHWICK
MULLBERRY ST
SYLVESTER ST
449
848
824
EARLE ST
NO1
RESERVOIR
BR.


CITY HALL
HIGHLAND ST
NEWTON HILL
PARK
PARK AVE
BEAVER BR
MAIN ST
SOUTHBRIDGE ST
MILLBURY ST
BALLARD ST
SOUTH WORKS
GREENWOOD ST
McKEON RD
986
WHITTALL
STILLWATER
HOPE AVE
PLEASANT ST
WORC ELEC
COES LORING CO
COES RES
501
WEBSTER ST
CEMETERY
FENCE RING WORKS
LEESVILLE
1522
PDS
BOYLE ST
CURTIS
CITY
WIER
472
883
MILL ST
4229
WORC WIRE
50 LUDLOW ST
OXFORD ST
AUBURN ST
QUEENSBURY
COMBING CO
515
STONEVILLE
4870
LUDLOW KETTLE
GEO E DUFFEY MFG
G F WRIGHT S&W CO
DOBE BEV
ELFSKIN CORP
STAFFORD ST
LYNDE BRK RES
824
LYNDF BR
692
1861
SYLVESTER ST
CHERRY VALLEY
ONLEYS
WORS SPINNING & FINNISHING CO
777
824
WAITE
821
MAIN ST
568
STON
RES
1772
WEST
BR


4°
1 SHE
MILLBURY
GREENWOOD ST
GREENWOOD ST
TO MILLBURY
OLD COMMON
CARLETON
SOUTHWEST CUTOFF
WORCESTER ENGINEERING WORKS
RAMSHORN BR RD
WEST MILLBURY
CHURCH
CEMETERY
BM 640
GLOVER MILLS
RAMSHORN MEADOW
BROOK
PONDVILLE
STONE RL
STONE RR
3219
327
1341
RR STATION
498
CENTRAL
HILTON
AUBURN
AUBURN ST
QUEENSBURY COMBING CO
OXFORD ST
KETTLE BROOK
OAK BR
AUBURN CEMETERY
MOSS RD
SOUTHBRIDGE
CEDAR ST
558
OXFORD
568
STONEVILLE RES
1772
LINCOLN ST
BM 678
DARK BR
WEST BR
OXFORD
WORCESTER

1 SHEET

5



WORCESTER COUNTY COMMISSIONERS

WORCESTER COUNTY ENGINEERING DEPARTMENT

PLAN OF

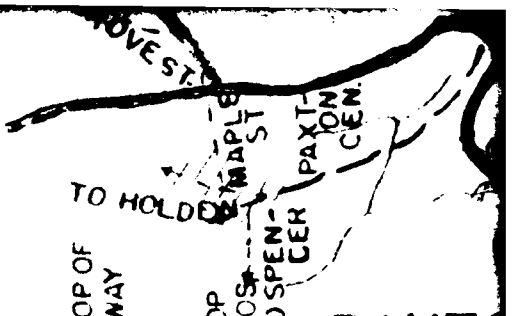
DAMS

FOR

AMERICAN STEEL & WIRE CO

COUNTY COMMISSIONERS

6

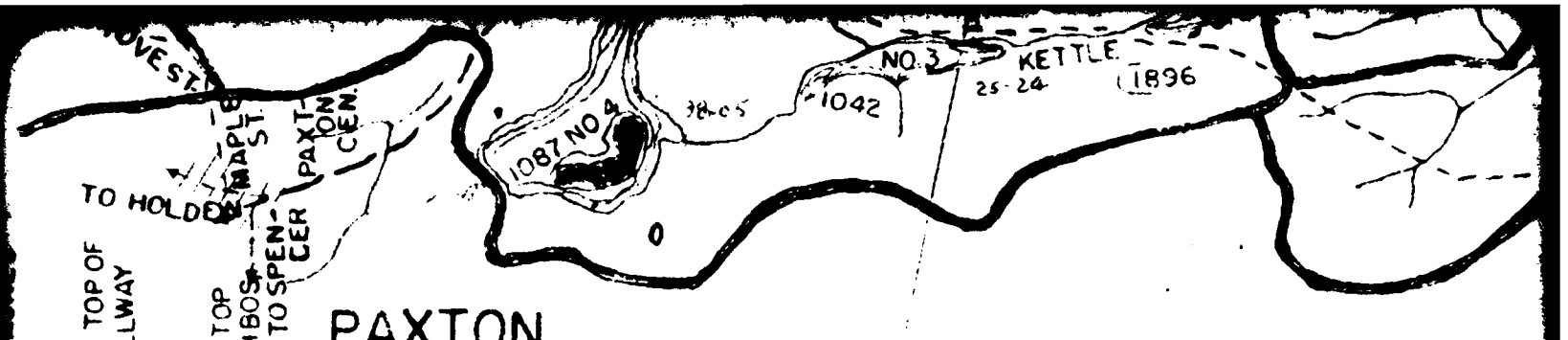


PAXTO

	POND NAME	CAPACITY OF POND IN MILLIONS OF GAL	AREA OF POND IN ACRES	INDIVIDUAL WATERSHED IN ACRES	TOTAL WATERSHED IN ACRES	ELEV. OF TOP OF DAM SPILLWAY	ELEV OF TOP OF FLASHBOARDS	YEAR BUI ORIGINAL DAM	PR D
61-02	CENTRAL WORKS *	5.3	5.3			443.40		1814	1
61-06	COES RESERVOIR *		119		4229				
61-05	CURTIS POND *	160	62	883	16663				
03-03	HILTON POND	40	26.4	1247	8732	96.56	98.38		1
61-15	LEESVILL POND	125		1522	15780				
03-05	MOSS RESERVOIR	256	158	699	699	110.79	112.17	CONCRETE REA 1921	1
03-04	PONDVILLE POND	125	45	2639	4746				
30-21	RAMSHORN POND.	720	145	1527	1527	22.0	24.0	PREVIOUS TO 1831	10 18
30-21	RAMSHORN MEADOW POND	22	38	580	2107				19
61-03	STILL WATER POND *	35	30	605	24319				
03-01	STONEVILLE POND		45	4870	7466				
03-02	STONEVILLE RESERVOIR	185	68	1772	1772				
03-07	SOUTHGATE POND	1.5	1.5	83	782				
61-01	SOUTH WORKS POND *	20.0	13.0	381	24700	438.04	440.04		1

* RUN OFF FROM WATERSHED EFFECTED BY CITY STREETS AND STORM SEWERS PLAN

NOTE: THE INFORMATION SHOWN ON THIS PLAN WAS DRAWN EXISTING PLANS, & FR PARTICUARLY THE G.E. GOODRICH REPORT NOV. 14, 1921 AND "MOSS RESER

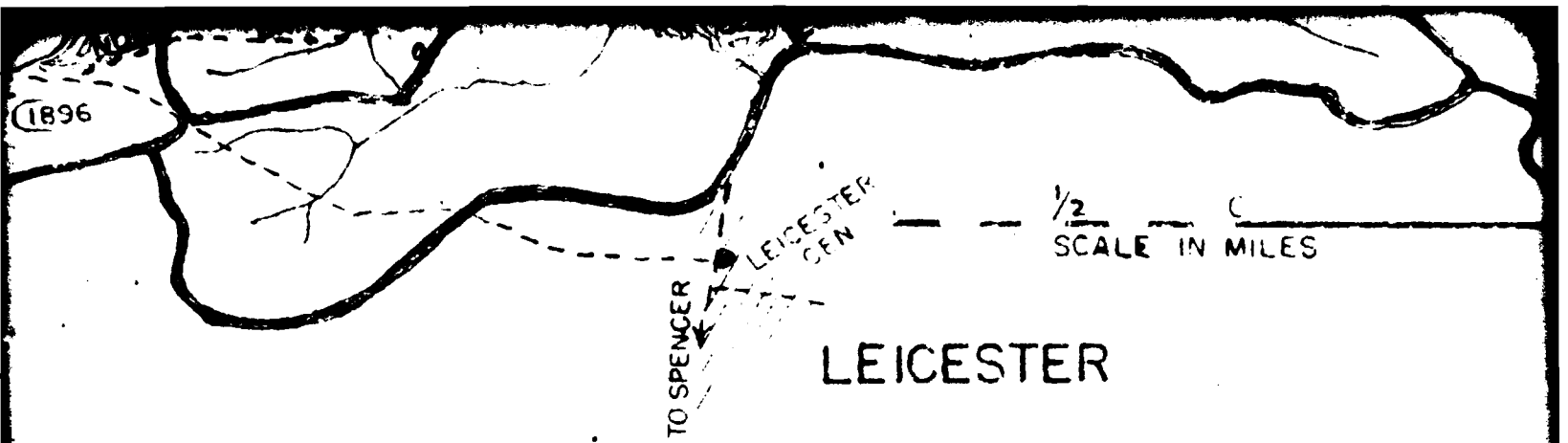


PAXTON

ELEV. OF TOP OF DAM SPILLWAY	ELEV. OF TOP OF FLASHBOARDS	YEAR BUILT ORIGINAL DAM	YEAR BUILT PRESENT DAM	TYPE OF DAM	HI
443.40		1814	1899	EARTH MASONARY TIMBER CORE PLAN B 177 1899 REPAIRS 1936 PLAN 12718	ELEV 4 SOUTH O 046 - WAY
					ELEV 47 OF SPILL WATER PAGE 2 PROPE
96.56	98.38		1939	GATE IS SCREW STEM 24" PIPE EARTH WITH CONCRETE CORE WALL PLAN FOR CORE WALL 9042 CONCRETE SPILLWAY PLAN 13530 - 31 10591 REPAIRS	
		CONCRETE	EARTH ADDED		
110.79	112.17	1921	1928	CONCRETE GRAVITY SECTION, COVERED WITH EARTH GATE SCREW STEM, 30"x 30" BOX OUTLET	ELEV. 112.0 SOUTH OF 8044 A
				STONE MASONARY	
22.0	24.0	PREVIOUS TO 1831	10' ADDED 1872-3	GATE SCREW STEM, 24" ϕ OUTLET PIPE (POSSIBLY) 30" EARTH PUDDLED 10' EITHER SIDE CHESTNUT CUTOFF WALL ALONG DAM ℄ (1873) PLAN 13515 A & B	ELEV. 24.2 OF N.W. C
			1916	GATE 36" ϕ OUTLET	PROPERTY
				EARTH WITH CONCRETE COREWALL, CONCRETE SPILLWAY PLAN 7171	
				RACK, PINON ? CONCRETE ?	PROPERT
					PROPERT
				GATE 30" ϕ OUTLET EARTH & STONE WALL	FROM M.
438.04	440.04		1831	FLOOD GATE - RACK & PINION, INTAKE GATE - SCREW STEM INSTALLED IN 1943 - MASONARY, PLAN 3955 INTAKE 14454 A-H SECTIONS THU. POND 3265 (1906) 12792 (1936)	ELEV. 44 ESTABLIS CROSS, A P.F. & F.

S AND STORM SEWERS PLANS FOR MOSS RES. DAM: CONCRETE, ORIGINAL DAM 8510 TO 12, PRES. CONS PROPERTY, 1877, 8044A & LOTS PURCHASED IN CE

RAWN EXISTING PLANS, & FROM FILES OF SUPT. OF ENG. & MAINT.
16, 1921 AND "MOSS RESERVOIR" DATA CONCERNING ORIGINAL OWNERS OF CEDAR SWAMP

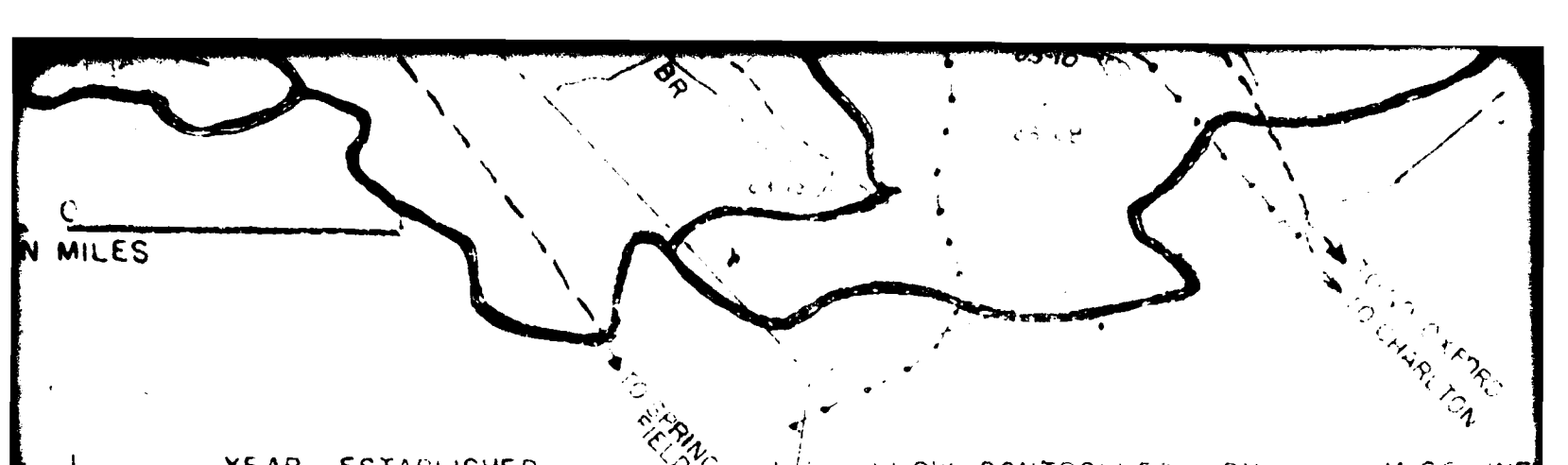


LEICESTER

	HIGH WATER MARK & WATER RIGHTS	YEAR ES
AN B 177 1899	ELEV 443.47 COPPER BOLT TOP OF STONE BOUND 11.5 SOUTH OF AND 153' W FROM S E COR OF MILL. FROM PLAN 3846 - BOUND IS SHOWN AS 60' UP STREAM FROM SPILL - WAY PROP. PLAN - 8038	1873 BY SUPERIOR P 127. WASHBURN CROMPTON CARPET
	ELEV. 473 51,, TWO FEET BELOW BOLT IN EAST CONCRETE WALL OF SPILLWAY. WORCESTER ELECTRIC LIGHT PLAN 1336	JAN 30, 1914 BY H.
PLAN FOR CORE - AN 3530 - 31	WATER RIGHTS PURCHASED 1917 FROM HILTON HEIRS BK 2123 PAGE 293 PROPERTY PLAN 8034 HIGH WATER MARK	
RED WITH EARTH OUTLET	ELEV. 112.05 BRASS PLUG IN LEDGE, EAST SIDE OF POND, 208' SOUTH OF SPILLWAY CREST PLANS 14628 - SEE PLAN 8044 A FOR PARCILS PURCHASE - ALSO 8771 - 8777	OCT. 21, 1924 BY
(POSSIBLY) 30" STNUT CUTOFF 5 A 8 8	ELEV. 24.29' IRON PIN IN LEDGE ON WESTERLY SHORE ELEV. OF N.W. COR. OF N W. BRIDGE WING WALL - 30.00	1872 REG OF DEEDS PURCHASED BY A. CU RAMSHORN POND CO
36" ⌀ OUTLET CONCRETE	PROPERTY MAP 8033	
	PROPERTY MAP 8769 (1904)	
	PROPERTY MAP 8769 (1904)	
0" ⌀ OUTLET	FROM M. BONZEY 1917 BK. 2123, P. 290	
GATE - SCREW PLAN 3955 OND 3265	ELEV. 443.47 SAME AS (CENTRAL WORKS) ESTABLISHED IN EXCHANGE OF TITLES BETWEEN HOLY CROSS, AM. S. & W. CO. CITY OF WORCESTER AND P. F. & F. W. TAYLOR PROP. PLAN 8041.	AP 29, 1909 BK. I (TAYLOR DEED)

AM 8510 TO 12, PRES. CONST. 10584, 10582-3, 10507 & S 10400, S 14628, TH
& LOTS PURCHASED IN CEDAR SWAMP 8771

CEDAR SWAMP



YEAR ESTABLISHED	FLOW CONTROLLED BY	M.S.G. INF
1873 BY SUPERIOR COURT DEGREE VOL 22 P. 127. WASHBURN MOEN MFG CO. VERSUS CROMPTON CARPET CO DEFENDANT	AMERICAN STEEL & W. Fl. 2	
	NO AGREEMENT - GOES CO	
JAN 30, 1914 BY H.A. PRATT PRIV. ENG.	NEW ENG POWER ASSOCIATES AM S & W CO CAN OBTAIN WATER IN EMERG.	OLDEST WAT ELEC LIGHT FOR CONDENS
	AMERICAN STEEL & WIRE CO	
	CONSOLIDATED RENDERING CO.	NECESSARY OF THEIR P
OCT. 21, 1924 BY COUNTY COMM	AMERICAN STEEL & WIRE CO.	DURING SUM OF WATER
	LAREE FABRICS MILLS INC WE HAVE NO AGREEMENT	USED FOR CL NO POWER U
1872 REG OF DEEDS, BK. 875, P132-149 PURCHASED BY A. CURTIS AS TRUSTEE FOR RAMSHORN POND CO. PREVIOUS TO RAISING DAM	RAMSHORN POND ASS - A.S & W. CO WORC COUNTY ELEC HOPEVILL MFG CO CONSOL RENDERING WHITTALL EL ON BLACKSTONE RIVER AM S & W. CO DAY CLOVER, W. WINDLE	MIN. FLOW REC WE - 1,500, 939 NEVER USED FOR IMP IN WINTER TO HORN POND
	WHITTALL ASSOCIATES CALL ENG RM FOR FLASH BY CHANGE	USED FOR POW WATER OTHER
	QUEENSBURY COMBING CO NEW ENGLAND POWER ASSOCIATES PURCHASED IN 1945	THE AGREEMEN COMBING CO. C WATER TO RU WATER BY CO
	AMERICAN STEEL & WIRE CO	DAM WASHE
AP. 29, 1909 BK. 1904, P. 68 THIS IS (TAYLOR DEED)	AMERICAN STEEL & WIRE CO.	18,700,000 FOR SOUTH WO AS MEASURED TO INTAKE C

THIS DRAWING AND ALL INFORMATION THEREON IS THE PROPERTY OF THE AMERICA AND IS CONFIDENTIAL AND MUST NOT BE MADE PUBLIC OR COPIED UNLESS AUTHO AND IS SUBJECT TO RETURN UPON DEMAND.

DAM N

AMERICAN STEEL & WIRE CO.

COUNTY COMMISSIONERS
JAN 1, 1947
MEETING DOCKET
SCALED AS NOTED

TRACED BY F.P.F.
TRACING CHECKED BY W.C.

DAM NO.

MISC. INFORMATION

COUNTY ENGINEER

OLDEST WATER PRIVILAGE IN SYSTEM. WORC. COUNTY ELEC LIGHT CO USES 2 MIL GAL 24 HRS (1921) FOR CONDENSING, POND KEPT FULL

NECESSARY TO KEEP POND FULL FOR SUCTION OF THEIR PUMPS

DURING SUMMER MONTHS RESERVOIR LOSES 2" OF WATER WITHOUT DRAW DOWN

USED FOR CLEANING & CONDENSING PURPOSES NO POWER USE

MIN. FLOW REQ BY SMALL MILLS WHEN IN OPERATION IS 6" THRU 36" WIRE WEIR = 1,500,000 GAL. DAY FROM H.W. CLOVER. FLOW FROM 1904 TO 939 NEVER HAS EXCEEDED 15" OVER SPILLWAY

USED FOR IMPONDING DURING RAINS & IN WINTER TO ENABLE CLOSING OF RAMS HORN POND GATE

USED FOR POWER WHEN PLENTY OF WATER OTHER USE IS FOR CLEANING

THE AGREEMENT IS THAT QUEENSBURY COMBING CO. CAN DRAW SUFFICIENT WATER FOR ITS PLANT WE CAN OBTAIN WATER BY CONTROLLING THE POWER CO

DAM WASHED OUT

18,700,000 GAL. PER DAY REG. FOR SOUTH WORKS & WIRE MILL AS MEASURED IN 1942 PREPARITORY TO INTAKE CHANGES

Y OF THE AMERICAN STEEL & WIRE COMPANY
ED UNLESS AUTHORIZED BY THEM

AMERICAN STEEL & WIRE CO
SUBSIDIARY OF
UNITED STATES STEEL CORPORATION

ENGINEERING DEPARTMENT USS

WORCESTER MASS

DRAWN BY JAN. 1, 1947, BROUGH
SCALE 1" = ½ MILE

17720

WATER SHED OF SOUTHWORKS POND

DAM NOS. AS NOTED IN PLAN.

WATERSHED PLAN
FIGURE D-1

10

APPENDIX E

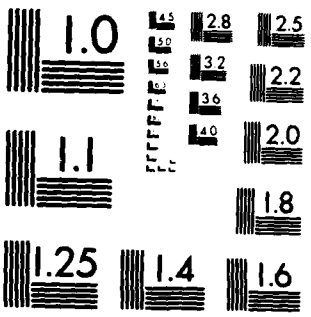
INFORMATION AS CONTAINED IN

THE NATIONAL INVENTORY OF DAMS

PREVIOUS PAGE
IS BLANK

AD-A146 194 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
LEESVILLE POND DAM (M..(U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV AUG 78

UNCLASSIFIED F/G 13/13 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

INVENTORY OF DAMS IN THE UNITED STATES

STATE	IDENTITY NUMBER	DIVISION	STATE	COUNTY	CONGR DIST.	STATE	COUNTY	CONGR DIST.	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY | MO | YR
MA	141	NED	MA	027	03				LEESVILLE POND DAM	4215.9	7150.1	08SEP78

POPULAR NAME	NAME OF IMPOUNDMENT
	LEESVILLE POND

REGION	BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY–TOWN–VILLAGE	DIST FROM DAM (MI.)	POPULATION
01	06	KETTLE BROOK	WORCESTER	0	172300

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUC. (MAX.) HEIGHT (FT.)	HYDRAU. HEIGHT (FT.)	IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT.)	IMPOUNDING CAPACITIES NORMAL (ACRE-FT.)	DIST	DAM	FED R	PRV/FED	SCS A	VER/DATE
RLPG	1830	R	15	12	420	250	NED	N	N	N	N	17AUG78

REMARKS

D/S HAS	SPILLWAY CREST LENGTH	SPILLWAY TYPE	SPILLWAY WIDTH (FT.)	MAXIMUM DISCHARGE (FT.)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NAVIGATION LOCKS NO	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)
1	304	U	88	1594	5000											

OWNER	ENGINEERING BY	CONSTRUCTION BY
J.P. REALTY CO.		

REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	NONE	NONE

INSPECTION BY	INSPECTION DATE DAY | MO | YR	AUTHORITY FOR INSPECTION
METCALF + EDDY, INC	24JUL78	PL 92-367

REMARKS